INDIA RUBBER WORLD
ELECTRICAL TRADES REVIEW

Published on the 10th of each Month by

THE INDIA RUBBER PUBLISHING CO.

TIMES BUILDING, NEW YORK, U. S. A.

JNO. R. DUNLAP. H. C. PEARSON.

Vol. 15. JANUARY 10, 1897. No. 4.

SUBSCRIPTIONS: $3.00 per year, $1.75 for six months, postpaid, for the United States and Canada. Foreign countries, same price. Special Rates for Clubs of five, ten or more subscribers.
ADVERTISING: Rates will be made known on application.
REMITTANCES: Should always be made by bank draft, Post Office Orders or Express Money orders on New York, payable to THE INDIA RUBBER PUBLISHING COMPANY. Remittances for foreign subscriptions should be sent by International Post order, payable as above.
DISCONTINUANCES.—Yearly orders for subscriptions and advertising are regarded as permanent, and after the first twelve months they will be discontinued only at the request of the subscriber or advertiser. Bills are rendered promptly at the beginning of each period, and thereby our patrons have due notice of continuance.

Entered at New York Post Office as mail matter of the second-class.

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CONSCIENCE AND COMMON SENSE IN IMITATION.

NEXT to the qualities necessary to man in order to live, none is more pronounced than imitativeness. It is within the compass of the most superficial philosopher to understand how large a part this ability to imitate plays in civilized communities,—so far, indeed, as to make it a measure of intellectual progress. Barbarous people may be placed in the scale of human development in proportion to their ability to intelligently imitate; the lowest places being held by those people in which the faculty is least wisely used. One extreme of imitation is shown in the fable of the cap merchant, who, on his pack being despoiled of its contents by monkeys, while he slept in a forest, plucked his own cap from his head, and flung it upon the ground in despair. This was immediately turned to joy, however, when the imitative apes, following suit again from the tree tops, placed the purloined property within its owner's reach. It may be that man is but a highly developed ape who had often rather watch his chance to appropriate a neighbor's store than labor to gather one for himself.

Yet it is not to be forgotten that, between the extremes of monkeydom on the one hand and skilful counterfeiting on the other, there lie innumerable degrees of imitativeness by far the greater number of which conduce to the welfare and advancement of humanity. The inventor grappling with new ideas and combinations turns over his older ones, well worked out, to the skilful craftsman who duplicates them in a legitimate and dignified way. Common sense, which is at the bottom of all right law, has safeguarded its operation by declaring that it must be conducted under such conditions as yield proper recognition to the originators of the ideas or things imitated. Moreover, the large unwritten law to which we give the names of common sense and honorable dealing, declares most emphatically against that species of imitativeness designed in a selfish manner to reap a harvest of another's sowing. Instances of this meet us on every hand simply because the avocations of civilized society are multifarious and contingent.

The saying "There is no sentiment in business," attributed to one of our most successful business men, would seem to preclude any consideration of imitativeness from a conscientious point of view. Apart from the danger of such saying as that quoted, it is safe to say that a business man who throws conscience to the winds acts in defiance of common sense as well as of common morality, and such a proceeding is usually, if not indeed inevitably, followed by a sharp rebuke and ultimate failure. For instance, manufacturers lacking originality, or unwilling to employ it so long as they can get up a passable imitation of what some other man has done, flood the markets with cheap jewelry, shoddy clothing, and adulterated food. Even so their reward is is almost certain to be meted out to them, and the customer who has purchased so called roasted coffee berries (really made from bean-meal molded to imitate the real thing), learns to fight shy of the seller and seeks another dealer.

On the other hand, imitation is sometimes really necessary as between one manufacturing firm and another. For instance, the general manner of a company making regulus of antimony some years ago decided—being a young man and intensely American—that the Yankee form of the ingot of metal should be distinctive in shape and not imitate the British mold in any way. This little piece of vainglory was nipped in the bud, however, for the antimony-using trade looked askance at the unusual form of the ingots offered them. Although a few tried to overcome the feeling of novelty repugnant to a very conservative trade, they soon found a very tangible difficulty in estimating the amount of metal a workman could break from the new ingot,—a thing accurately enough known with regard to the old. As a result the new molds were given up, and the older ones extracted from the scrap-heap to perform honorable imitative service once more. There is a large class of imitations to which the foregoing serves as an illustration, and it may be well summed up in the words of a Chinese sage, "A man may choose the cut and fashion of his garments, but no man has a right to go naked."

But after considering the laudable and conscientious imitations of labor and of custom, and dismissing the fradulent imitations of the professional adulterationist who produces wine but not from grapes, coffee that never grew on a coffee-tree, ivory innocent of travel, "pure gum" containing but little rubber, there is seen to be quite another form of imitation more subtle and noxious than any yet mentioned. That is the practice unblushingly adopted by some of imitating the names of a well-known concern closely, so as to engender confusion and secure business from the unwary that really is intended for another. This —a crime equally against conscience and common sense— is hapily not very frequent although its congener, the imitation of trade-marks, is of wider spread. Yet recent decisions have not only so emphasized the lack of legal right to thus imitate, but have so clearly pronounced upon its fraudulent intent, that it is likely that the conscience in this regard will be far more wary than in the past.

THE INCREASING IMPORTS OF SCRAP RUBBER are a tribute to the superior ingenuity of American factory-managers and to the fact that the payment of higher wages in this country is not inconsistent with economical production. It would seem natural that in Europe, where a larger percentage of cheap rubber is used in manufacturing than in America, the production of reclaimed rubber would be most largely developed. But, on the contrary, the transatlantic demand is chiefly supplied from this side of the ocean. It is worthy of note that Germany, which boasts of her progress in technical education, with a view to lessening the cost of manufacturing, contributed last year one-half of the 1900 tons of old rubbers imported by the United States.

THE SUGGESTION THAT MR. BANIGAN'S recent visit to Europe was for the purpose of laying the basis of an export trade in rubber-shoes seems not unreasonable, in view of the fact that the Woonsocket Rubber Co., under Mr. Banigan's control, produced a good share of such goods of this class as were exported from the United States during several years. While the rubber shoes most in favor here could hardly find a large sale in any foreign country, on account of the difference between the native styles of leather shoes and our own, it appears that success has recently attended the efforts of the leather-shoe makers in America to find a foreign market, and wherever this is true the American-made rubbers would be found better-fitting than those made abroad. It would be worthy of such a thoroughly-equipped and so successful a manufacturer as Mr. Banigan to devote his energies to the opening of a new market for a class of goods which he has done so much to improve and bring into widespread use in his own country. He would be followed, of course, by imitators eager to share his successes, but he could be depended upon not to lose the leadership in the new field.

NEW GRADES OF INDIA-RUBBER are constantly appearing in the market, while none of the old ever seem to drop out of sight, all of which is testimony to the constant opening of new sources of supply. A year or two ago "Mollendo" rubber was unheard of, and now it figures in every report from the English markets. "Lagos" rubber, too, has meanwhile leaped from zero to the second place, in volume, among all the grades known to commerce. There can be no doubt that Venezuela, Bolivia, and Peru are destined to reveal a much greater rubber-yielding area than has yet been suspected, to say nothing of vast sections of Africa as yet unexplored. Any talk of the supply becoming exhausted is, therefore, mere nonsense.

THE HISTORY OF MONEY-MAKING IN RUBBER is more like romance than fact. No other branch of manufacture, in any country, has yielded large fortunes so rapidly as the rubber industry in the United States in the last fifty years. The story of many of the large concerns is familiar to the trade in general, but the names which figure most prominently are, as a rule, those of the business management. Doubtless if the whole truth were known, however, a great deal more credit would be due to the practical men who have filled the position of superintendent in the great factories, for which reason THE INDIA RUBBER WORLD purposes, during the present year, giving a record of the lives and work of a number of rubber superintendents.

THE GUTTA-PERCHA CROP OF 1896.

ADVICES from Singapore dated November 20 record the shipment of Gutta-percha, from the beginning of the year to that date, as follows:

	Piculs.		Pounds.
To Great Britain	24,231	=	3,230,800
To Europe (continent)	15,366	=	2,048,800
To the United States	1,418	=	189,067
Total	41,015	=	5,468,667

These figures, for a trifle less than eleven months, are larger than the total shipment of Gutta-percha from Singapore for either of the years 1892 and 1893. Unless the shipments were at a larger rate during December, however, it is probable that the total for the year fell below that for most of the years during the past decade. England's share of the total is even greater for the period covered by the table than usual.

A NEW machine for slicing, splitting, or cutting crude India-rubber, to prepare it for sale, has been patented by Louis Sgal, of the rubber firm of Sgal & Co., Liverpool. Another machine for a like purpose has been patented by Henry Crofts Longsdon, Keighley, York, England.

THE MANUFACTURE OF INSULATED WIRE.*

By Frederic A. C. Perrine, D. Sc.

THE earliest attempts at insulating wire were made with pure rubber strip, the strips being spirally wound upon the wire, and afterward consolidated by a slight amount of heat into a solid mass; but all of such attempts were failures on account of the readiness with which the rubber would absorb moisture, become oxidized, and be softened at an elevated temperature. A curious action between the rubber and the wire was also observed at the time of these attempts, the copper wire becoming slightly oxidized and the rubber rendered liquid at the surface of the conductor. It was subsequently found that this was due to the medium used for preventing adherence between the sheets of rubber, for which purpose use was made of soap and potash, substances which subsequently liberated oxygen and grease, one of which would attack the wire, and the other the rubber.

Gradually this method of insulation has been abandoned in favor of the use of vulcanized rubber, which has more recently given place to a vulcanized compound of rubber which is called in the American trade "mechanical rubber."

Many manufacturers make advantageous use of rubber substitutes which by others are considered adulterations and injurious to the quality of the manufactured product; these consisting principally of oxidized oils, paraffin, resins and rubber shoddy; and though it is undoubtedly a fact that all such substances are capable of great abuse, it is nevertheless true that the skillful employment of these substitutes will produce a product of good quality and will sometimes even result in a superior article to that which can be produced with the ordinary qualities of pure gum. Purification of resins for this purpose consists in the entire elimination of all organic acids, and by their employment a rubber compound is produced more readily softened by heat than can be obtained with any pure gum. Their legitimate application consists of their use in the manufacture of rubber-coated cloth called "friction cloth," and which forms the taping material for finishing the outside of large cables and rubber wires. The oxidized oils are produced by a continued heating of drying oils in the presence of some metallic oxide readily reducible, such as red lead, the product being a flexible resin of a gummy nature, often hard to distinguish from the inferior grades of rubber. Rubber shoddy is a compound obtained by subjecting old rubber which has been mixed with sulphur and vulcanized, to a treatment with steam, sulphuric acid and chloride of zinc, the effect being that most of the vegetable fibers and the sulphur contained in the compound are removed. When the rubber compound thus manufactured consists of clippings from articles to be vulcanized and treated before vulcanization, the shoddy obtained differs but little from pure rubber; the treatment amounting to nothing more than a chemical solution of the fibers of cloth or other foreign substances retained in the clippings. This class of shoddy is obtained in only very limited quantities, and it is perhaps unjust to class such a material with the more common rubber shoddy which is produced by the devulcanization of completed mechanical rubber goods, such as are purchased by the rubber shoddy manufacturers from the rubber junk dealers; this latter form of shoddy is more difficult to obtain entirely free from fibrous materials, while the devulcanizing process, although removing a greater part of the sulphur of vulcanization, does not return the rubber to its original condition, nor does it remove the mechanical admixtures of earths and oxides employed in manufacturing the original articles. In consequence, the proportion of rubber in rubber shoddy is an uncertain quantity, so that its employment is attended with a considerable danger of producing an irregular product. In spite of this difficulty, however, it is undoubtedly true that certain grades of rubber shoddy may be so employed by skillful rubber mixers as to increase the mechanical strength of the resultant compound, and many rubber manufacturers using a compound containing an admixture of high-grade rubber shoddy obtain a covering which gives good service when exposed to the action of the elements, while others who never employ this material are unable to obtain a wire insulation which will withstand the oxidizing action of the light to an equal extent. The reason for this apparently being that the previous vulcanization has rendered the rubber unchangeable under the ordinary influences which will deteriorate compounds of pure gum.

Among the earliest discoverers of this principle may be mentioned A. G. Day, the inventor of "Kerite" insulated wire, and of hard rubber, who, after very many years of experimentation on the vulcanization of linseed oil, abandoned the material as well as pure vulcanized rubber for a vulcanized compound of oxidized linseed oil and rubber, combined with various vegetable oils; thus producing a material which, while having a specific insulation resistance somewhat less than pure rubber, still obtained a wire mechanically more durable than any previously manufactured from pure rubber. Following the method of Day many manufacturers have employed these substitutes for the improvement of vulcanized rubber in wire covering, and have evaded the implication of dishonesty by applying to their products special trade names: Nigrite, Voltite, Bitite, etc., some of which materials contain oxidized oils, special varieties of rubber shoddy, petroleum residuum, ozocerite and special grades of bitumen, all mixed with rubber and subsequently vulcanized.

Pure rubber without admixture of sulphur and vulcanization is rarely employed as an entire insulator for a wire, though one of the best of the rubber cores was formerly manufactured by covering the wire directly with a taping of pure rubber surrounded by a layer of rubber compound containing no sulphur, and finally protected from external influence by a vulcanized sheath. This wire is generally known as Hooper's core and was invented as early as 1860 by M. W. Hooper, of England, the construction aiming to remove the sulphur so far from the copper wire by the interposition of two unvulcanized layers that no action would take place between the material of the wire and the sulphur of the outer covering. This method of protecting the copper is exceedingly expensive and presents no distinct advantages over the more modern process of tinning the copper wire, a device which is found to effectually protect it against the action of the sulphur. Some manufacturers, however, continue to employ an inner coating of unvulcanized rubber compound, and, indeed, some such method seems necessary with very small wires, in which case the tinning does not grant perfect immunity from the action of the sulphur. It is also argued in favor of this method of manufacture that the unvulcanized inner coating forms an additional insulation, reducing the possibility of mechanical defects in wires covered with a single coating, but this seems to be a doubtful claim on account of the fact that an unvulcanized rubber compound will absorb

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water quite readily even were it possible to assume that the compound itself did not retain water after the wire had been vulcanized in a steam bath. Considerable amounts of water have, in fact, been found by the author in such a coating where the coating by itself had been removed and carefully desiccated. A better method of protecting the wire against the action of sulphur and at the same time of obtaining a high value of insulation seems to consist in coating the wire with more than a single covering of rubber compound capable of being vulcanized, the mixing being so carried out that those toward the inside are prepared with a smaller amount of sulphur than the outside coating destined to withstand mechanical strains.

Before vulcanization, rubber compounds are comparatively inelastic and very plastic, readily united by pressure across freshly cut surfaces. Taking advantage of these facts two general methods are employed in covering wires with rubber for the purpose of insulation. In the first method the rubber compound which has been thoroughly mixed by the grinding rolls is passed through a series of calender rolls which deliver the product in a thin uniform sheet. These rubber sheets are then cut into strips of such a width as to easily surround the wires to be insulated and applied to the wire by a machine which guides the rubber strip around the wire and afterward consolidates it into a tube by pressure from a pair of grooved wheels furnished on one side with a cutting edge destined to remove any excess of rubber compound occasioned by an extra width of the strip. Provided the surfaces joined together are clean, this method of covering produces a continuous insulating tube, and has the additional advantage that the rubber may be applied at the temperature of the workroom when it is sufficiently strong to maintain the wire accurately in the center of the insulation, an object difficult to attain when covering with rubber compounds at a higher temperature. Wires manufactured in this way may be readily distinguished by the presence of a longitudinal seam which remains in the finished product where the wheels have joined together the strips and removed the superfluous rubber. The ease with which the wire is centered in this process attains particnlar importance in the covering of heavy copper wires. The defect of the process is that unless the surfaces of the rubber are absolutely clean minute leaks occur through an imperfect union, and in consequence many manufacturers prefer to employ a tubing machine for wire covering, particularly in small sizes. This tubing machine as manufactured in this country consists of a hollow iron cylinder with a long pitch screw revolving on an axis parallel to the axis of the cylinder and enclosed entirely within it, the cylinder at the front of the screw terminating in a chamber containing a core and pierced with an opening where a die is held, the die having an internal diameter equal to the diameter of the finished wire desired, while the core is bored out to the size of wire employed and held so that it projects within the die in such a manner that when the rubber is forced between the core and the die a tube is formed closely surrounding the wire with an external diameter equal to the internal diameter of the hole in the die. In such a machine the rubber is fed at the back of the screw which carries it forward into the chamber containing the core and die until in due course it is forced out as a tube, carrying the wire with it held in the center. This machine, on account of its method of operation, applies a very considerable amount of pressure to the rubber compound as it is molded around the wire and makes a very compact and continuous coating; it is, however, impossible to force the rubber through a machine of this character unless the temperature is raised slightly above the temperature of the air, and where the wire is heavy and the completed product as delivered from the machine is not completely cooled before being reeled up, serious decentering of the wire within the core occasionally takes place, although as we have said, this is not a difficulty to be feared with small wires, nor is it likely to occur when the rubber is applied in a series of thin coatings in place of a single thick layer.

However the rubber covering may be applied to the wire before final vulcanization, it is necessary to give some external support to the rubber in order to prevent it from swelling up and becoming porous during the process of vulcanization. With small wires sufficient support is provided by coiling the wires helically within a pan and packing closely in powdered chalk or talc, but for larger sizes it has been found necessary to cover the wire with either a tape or braid closely applied. One manufacturer who applies rubber in strips by the means of wheels as described above surrounds the completed wire with a coating of tin foil which is removed after vulcanization; as applied in this manner a thoroughly compact vulcanized rubber is obtained, though there is a certain amount of danger, in removing the tin foil, of cutting the insulation and making defects which must be repaired when the wire is finally tested for insulation resistance before shipment.

The final operation to which rubber-covered wires are subjected, repeatedly referred to under the name of vulcanization, consists in effecting a combination between the rubber and the sulphur, with which it has been mixed, under the influence of heat, at temperatures between 120° and 140° Cent., continued for periods varying from three-quarters of an hour to five or six hours, the variation in the time and temperature being the means of rendering the complete material of any required hardness and elasticity within limits determined by the quantity of sulphur present. For ordinary wires the application of a temperature about 130° Cent., during a period of one hour, may be considered as the average practice; a lighter vulcanization can be used only when the completed rubber is designed to have properties but slightly different from those of pure gum, while the higher temperatures in connection with larger amounts of sulphur are employed when it is desired to produce an inelastic solid material such as is generally called ebonite or vulcanite. Some manufacturers prefer to use for vulcanizing chambers hot ovens warmed by steam coils, and for a long time it was thought that this was the only method safe to use in the manufacture of a wire coating to have a high insulation resistance, but more recent experiments have proved that the presence of dry steam is not only not injurious to the insulating properties of rubber compounds, but that it even tends to make the rubber coating more solid and more flexible. In consequence, most manufacturers now perform vulcanization in large iron tanks, closed with a removable cover, into which dry steam is admitted, directly surrounding the rubber articles to be vulcanized. A proper union between the sulphur and the rubber will not take place if there is any considerable amount of moisture present in the steam, and especially if water of condensation remains within the vulcanizing tanks, and, in consequence, rubber wires are occasionally found which show imperfect vulcanization in certain parts of the coil, where the wire, during the heating process, has lain in water condensed within the vulcanizer and not properly drained away, a defect which is often difficult to discover, even on an immersion test, but which unfailingly renders the rubber liable to oxidation when exposed to the air or sunlight. The combination between rubber and sulphur seems to be only partially of the nature of chemical composition, and, indeed, if vulcanized rubber is to be considered as a definite chemical compound, the combination is not only unstable but also difficult to form completely, and in consequence thin rubber, when

examined under a microscope, will be found to separate into crystals of sulphur and particles of gum as it is subjected to atmospheric influences. Furthermore, subsequent high heating will always increase the vulcanization of elastic rubber and rubber compounds, rendering them inelastic and brittle.

These peculiarities vary at different times and with different compounds, so that the complete test of a rubber-coated wire includes not only measurements of the insulation resistance when immersed in water, but also mechanical tests as complete as is possible, but particularly a test to determine the action of the atmosphere on a strained and deformed portion of the rubber covering, such as may be obtained by winding a wire about its own diameter and leaving it for a considerable period of time in a position exposed to all possible atmospheric influences.

In order to protect such an insulated wire from the effects of frost and sunlight as far as would be possible, most manufacturers prefer to finish the outside with a braided or taped covering with a polished asphaltum surface, such as has been described in the manufacture of weatherproof wire, this surface being called by rubber manufacturers a "slicker."

The reasons for the nonuniformity in weight per foot and thickness, which render the sale of weatherproof wire by the pound advisable, do not exist in the case of wires insulated with rubber coatings, and in consequence they are sold by the foot, reference being made at the same time to the thickness of the insulation and to its specific insulation resistance, though we should not confuse the value of the insulation resistance in megohms with the insulating power of a wire in service, since the loss of energy through the insulation is at all times an inappreciable amount of the total quantity of energy transmitted, and in consequence we must consider the mechanical properties and power to remain constant of much greater importance than the tested value of any particular insulation. It is for this reason that we have called attention to the fact that the purest rubbers are not always the best insulators, since it is found that the mechanical properties of rubber wires are improved by the presence of certain rubber substitutes, though it may be also true that these substances reduce the specific resistance of the insulating material.

The thickness of insulation necessary with rubber-coated wires to withstand different electric pressures has been much discussed by the various boards of trade and underwriters' associations of this and other countries, but no definite conclusions have been reached or rules laid down beyond the arbitrary instructions of the British Board of Trade, which state that all conductors carrying current at less than two thousand volts shall be covered with an insulation at least one-tenth of an inch thick, and that the insulations for heavy voltages shall be measured in inches of thickness by the quotient expressed in dividing the voltage by twenty thousand. This rule is entirely an arbitrary one and imposes a considerable tax on distribution at low voltages, besides rendering the insulation of a small wire unnecessarily bulky. As a substitute it has been proposed that the insulation should not be less than one-half the diameter of the wire where the voltage does not exceed two thousand, proportionate increase being made for higher voltages, though this also takes no account of the actual factor of safety in any particular installation. We are beginning now to recognize the fact that the thickness of insulation for any wire may be obtained by breaking-down trials, allowing a satisfactory factor of safety in the case of each insulation thickness. Wire coated with a rubber coating three-sixteenths of an inch thick will not be pierced with a voltage smaller than about fifteen thousand, and we would accordingly consider that one-sixteenth of an inch of rubber will give a factor of safety of five for three thousand volts of strain, though without further experiment it is not possible to state distinctly that the protection offered by an insulation varies directly with its thickness. Indeed, other trials involving a piercing of dielectrics seem to indicate that their resisting power is proportioned more nearly to the square than to the first power of their thickness. Though in insulating wires used for transmitting alternating currents it is unsafe to assume that the resisting power varies more rapidly than the first power of the thickness on account of a general uncertainty concerning the relation of maximum value of the electromotive force to its average value on account of great variations in the forms of different electromotive force curves generated by commercial machines.

In the pages which have preceded, in a series the general types of insulators have been described which are regularly employed for protecting wires, and while the method of manufacture is the same for each material in every form of use, special combinations in construction and in manufacturing methods have been introduced in order to adapt these general insulating plans to definite and particular requirements—the products of these various specialized processes being known by the title of the department of construction in which they are to be employed; as we may speak of overhead line wires, underground cables, aërial cables and submarine cables without necessarily indicating wires different in construction. For use in overhead lines any one of the insulated wires which we have described may be employed without further modification, excepting only Gutta-percha wire, which is much too readily influenced by the oxidizing action of sunlight to be employed for such purposes. The manufacture of the overhead line conductor has therefore been already completely discussed; but for use underground and for submarine work these wires must all be protected in special ways in order to prevent injurious mechanical and chemical action upon the insulators.

For general use in this country, in building underground lines highly insulated cables have been employed, the insulating material being further protected by a covering of lead pipe. This system of cable construction was one of the very first attempted for the construction of telegraph lines; indeed, we find that in 1838, the year following the introduction of the telegraph into England, an English patent was issued to W. T. Cook in which he describes his conductors "as laid within solid lead pipes." In 1845 two further patents were issued: the first, to Wheatstone and Cook, in which the modern method of lead-incasing cables with a lead pipe machine is described; the second, issued to W. Young and A. McNair, specifies the same system of lead-incasing and according to the same processes.

Lead cables were laid in the streets of London in 1844, identical in construction with those made at the present time.* Indeed, the various early inventors described all possible processes of covering cables with lead; by drawing them into pipes, by forming the lead pipe around the cable, by taping the lead spirally or longitudinally and soldering the joints, by drawing down a large lead pipe tightly over the cable by the means of dies or rollers. We see, therefore, that the construction of a lead-enclosed cable was adopted from the earliest times and that this system has had an opportunity of an exceedingly long trial. The necessity for some sort of protection to insulated wires laid underground was noticed from the first on account of the very injurious action of the various acids and solids found in the soil, and particularly the injurious activity of acetic acid. The different acids and oils destructive to insulation are so varied in character and action that no effectual compound has been found which is capable of withstanding their influ-

* "Manual of Telephony," Preece & Stubbs, page 451.

ences. In consequence, wherever an underground cable is insulated with any nonconducting material the permanence of the insulator depends upon the existence of a hermetically sealed sheath. Further, on account of the fact that this sheath must be perfectly made and continuous for the whole length of the conductor, it is possible to employ in the insulating of underground conductors materials which, while high in insulating property, are readily saturated by moisture and which cannot be relied upon as insulators without the inclosing sheaths; and in this form of construction much use has been made of loosely wound yarns saturated with soft waxes, of paper and of cotton, both dry and impregnated.

Machines for forming this lead-incasing are exactly similar in principle to the core and die machines already described as used for covering wires with rubber, the difference in the construction of the machines being entirely due to the greater pressures necessary in forming lead pipe. Two distinct systems of machine construction are employed, depending upon the condition of the lead when it is forced through the dies and onto the cable. In the first system, used in France but not employed in this country, a pipe of molten lead is forced out, surrounding the cable and immediately cooled as it issues from the lead press. In using this method there is constant danger of scorching the insulation of the cable, also of making imperfect pipe, and, in consequence, where it is employed two coatings of lead are considered necessary, separated the one from the other by a layer of asphaltum or pitch compound.

In this country lead manufacturers use the lead either cold or at a temperature just below the melting point. When manufactured in this manner, the pipe will be perfect unless the lead should contain particles of foreign matter. Fortunately we can be sure of the perfection of lead pipe manufactured in this manner on account of a peculiar phenomenon exhibited by lead when passing from the molten to the solid state—a property due to its exceedingly great shortness at the temperature of solidification. This phenomenon may be easily seen by anyone who will take a quantity of molten lead in a wooden basin and agitate it by rocking the basin as it cools; it will then be noticed that at the temperature of solidification the mass of liquid lead which has moved around in the basin, as a quantity of mercury would do, suddenly falls into minute fragments which cannot again be united without remelting. This is sometimes described as oxidation and the finely divided lead obtained called an oxide, but the ease with which this may be remelted into a solid mass disproves the supposition and shows that at the temperature of solidification the metal becomes so brittle that it will not withstand even a slight stress. If the lead is not agitated until after solidification has taken place, it is readily malleable, and, indeed, may be readily welded without further heat under the influence of a heavy pressure. These properties, as we have said, insure the perfection of forced lead pipe, since it is impossible to make a pipe at all at a temperature higher than that at which the lead becomes malleable when it is also readily weldable. No theory is given here, but rather the actual experience obtained from the practice of lead pipe manufacturers who find their pipes to be perfect unless foreign matters become mixed with the molten lead in the machine cylinders.

The presses used in lead-incasing cables consist of a pair of heavy steel castings strongly bolted together and locked one above the other, the lower casting being bored out to a diameter of from fifteen to twenty inches and lined with copper, thus forming the cylinder of a hydraulic press. The ram of this press carries on its head a steel chamber called a "core box," containing a core and die of exactly the same nature as the core and die already described for the manufacture of rubber-covered wires. Above this chamber is bolted a lead-containing cylinder opening into the core box. This cylinder is open at the top, the lead ram being bolted to the upper steel casting of the press, the lead rams and cylinders used varying in diameter from five to eight inches, depending on the size of the lead pipe to be formed. In operation the hydraulic ram is lowered as far as possible, carrying with it the core box and the lead cylinder, till a charge of lead can be run into the lead cylinder; the pressure is then applied and the lead cylinder raised until its ram is brought down on the top of the molten lead with a slight pressure, where it remains until the lead has become solidified, when the hydraulic pressure is increased to between six and eight thousand pounds per square inch, equivalent to a pressure on the lead of between fifty and sixty thousand pounds per square inch, when the solid lead flows between the core and die and passes out from the machine as a continuous pipe. As soon as the entire charge within the cylinder has been forced out, the lead cylinder and water ram are lowered as before, withdrawing the lead plunger and allowing a second charge of lead to be run into the lead cylinder, which unites with the portion of the first charge remaining within the core box, and, as pressure is subsequently again applied, the pipe is delivered without the least break at the point of union between the two charges of lead. This operation may be repeated as many times as will be necessary to cover a particular length of cable, as it is found that cold lead unites into a solid mass under a pressure of thirteen tons per square inch and flows at a pressure of thirty-three tons per square inch.*

From this it is seen that lead may be worked and will form a continuous pipe at any desired temperature below its melting point, and that this operation does not necessarily injure any insulating material by reason of the high temperature necessary in the operation, nor is more than a single coating necessary for a perfectly solid pipe.

Gutta-percha wires are rarely lead-incased by this process, but such cables are made having India-rubber as an insulation, and, as we have stated, fiber and paper are also used. While these fibrous coverings are similar in character to the weather-proof wires we have already described, certain essential modifications are made in them when they are employed for cables. In the first place, as no particular mechanical strength is required for the insulating material, yarns are rarely braided upon the wires, but they are more generally applied by the cheaper process of winding, larger diameters of yarn being also employed, the general practice being to apply at least one-sixteenth of an inch of insulation in a single winding. In order to obtain the high values of insulation required in cable working, these yarns are applied without compound and thoroughly desiccated in ovens before saturation is effected.

For the purpose of saturation, waxes rendered liquid by solvents are not used, but, on the contrary, materials softened by heat are invariably employed. Any wax or gum capable of being rendered so liquid by heat that it will saturate the yarn may be employed; but in this country use has only been made of paraffin, ozocerite, asphaltum, petroleum residuum and rosin, though sometimes manufacturers prefer to soften these materials by an oil admixture rather than to use them alone; rosin with cotton seed oil or rosin with rosin oil being the favorites. The values of these oils consist in their power of making the waxes viscous at all temperatures and allowing any cracks made in the cable under the lead covering to be naturally healed. Should such a crack be formed within the insulation

*See "Experiments," by Professor Spring, of Liège; "Mixed Metals," A. H. Hiorns, page 73.

of any lead-incased cable a partial vacuum of comparatively high conducting power is obtained and the insulating power much diminished. This fact, perhaps, explains the curious fact that such insulation seems to possess a breaking-down point which cannot be greatly increased by an increase in thickness, the reason being that all fibrous materials will retain a certain amount of air unless saturated in a vacuum, and on cooling the air contracts, leaving vacuous spaces which by their number and the air pressure within them determines the insulating power of the covering materials.

Both paper-covered cables and yarn-covered cables for special purposes have been employed under a lead sheath without auxiliary insulating material, and particularly for telephone purposes high insulation with low specific inductive capacity can thus be obtained, such construction is admirable, but where high potentials are to be withstood these dry materials have not been found to be as reliable as the same substances when saturated. It seems curious that dry paper or dry cotton, giving a much higher insulation resistance than the same materials saturated, should be more readily pierced by the application of a high electromotive force; but when we consider that such cables are generally lead-covered directly from the drying ovens we see that at normal temperatures the air pressure within them is low, approaching that of a Geissler tube, and also we know that the loose free fibers of the insulation may carry a charge from the wire to the lead, exactly as though they were a series of suspended pith balls. Taken together, these two facts will explain the fact and justify the exclusive use of saturated fibers for high potential cables.

Cables for suspension in the air have sometimes been protected externally by a wrapping of rubber laid either spirally or with a longitudinal seam, but in almost all cases lead-incased cables are now used for carrying electric light, telephone and telegraph currents, whether overhead or underground. We may tabulate such cables according to the following plan:

CABLES.	No. of Conductors.	Character of Conductor.	Size of Individual Wires.
Electric light less than 500 volts..	Single.	Stranded.	No. 10 B. & S. or smaller.
Arc lighting.....	Single.	Solid.	No. 6 or 4 B.& S.
High tension pow'r transmission....	Single, concentric or duplex.	Stranded.	No. 10 B. & S. or smaller.
Telegraph, submarine.....	Multiple wires.	Stranded.	No. 19 B. & S.
Telegraph, short cables.....	Multiple wires.	Solid.	No. 14 B. & S.
Telephone.....	Multiple wires.	Solid wire.	No. 18 or 19 B.&S.

	Thickness of Insulation.				Thickness of Lead.
	Rubber.	Saturated Fiber.	Saturated Paper.	Dry Paper.	
Electric light less than 500 volts..	inch. $\frac{6}{32}$	inch. $\frac{6}{32}$	inch. $\frac{5}{32}$	inch. $\frac{5}{32}$	inch. $\frac{1}{16}$ to $\frac{1}{10}$
Arc lighting.....	$\frac{5}{32}$ to $\frac{6}{32}$	$\frac{6}{32}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{1}{16}$
High tension pow'r transmission....	$\frac{5}{32}$ to $\frac{6}{32}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{1}{16}$
Telegraph.....	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{2}{32}$
Telephone.....	$\frac{1}{16}$	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{64}$	$\frac{1}{16}$ to $\frac{1}{8}$

It is not to be understood that these dimensions are in any sense exact, as will be at once apparent to a practical engineer, but the principal difference between the various types of cables are here sufficiently well laid down to enable a comparison of the various systems of construction. In the case of paper-insulated electric light, telephone and telegraph cables we find the paper sometimes applied spirally without the use of any binder; but where a low specific inductive capacity is sought in telephone working the paper is laid upon the wire longitudinally and held in place by a spiral wrapping of cotton yarn, a system of construction which is found to give the proper distance between the wires with the use of a minimum amount of paper and a maximum amount of air in the insulation. Outside the lead of cables designed for use underground, some protecting material is generally applied, either in the form of a braid or tape, thoroughly saturated with asphaltum. This protection is necessary on account of the fact that pure lead becomes easily corroded under the action of organic acids always present in the soil and always entering the cable ducts. Further resisting power is also given to the cable covering by an admixture of three per cent. of tin in the lead, but as this material hardens the lead coming from the press it is often omitted by the workmen, even when they are instructed to introduce it, particularly where they are paid upon the amount of cable constructed. Argentiferous lead also resists the action of inorganic acids for a long time, but under present methods of refining, such lead is rarely found in the market.*

For submarine use, lead cables have been sometimes employed across bays to a length of about two miles; but as the protection offered by the lead pipe is not sufficient to withstand serious mechanical injury, and as the weight of leaded cable is very great, their use is not extended beyond short distances, and only in such cases where a particular type of cable of low static capacity is employed which could not be efficiently protected in any other manner. The general type of submarine cable for bays and rivers consists of one or more rubber-covered stranded wires twisted together and then protected by an external bedding of tanned jute around which a number of heavy iron wires are spiralled to form a heavy, strong armor, the size and number of iron wires employed depending upon the diameter of the cable and the liability of disturbance from ships' anchors or keels. Tarred jute was formerly employed as a bedding for the iron wires, but it is now abandoned on account of its semi-insulating properties interfering with testing for faulty location, while the tanning protects it just as effectually against decay. The common type of telegraph cable used in this country contains from three to ten conductors, surrounded with a jute coating about a quarter of an inch in thickness, and armored with galvanized iron either 165 or 204 mils in diameter, but where there is great likelihood of interference from ships the iron wire is increased in size to a diameter of 300 mils, These cables are generally laid without further protection for the iron beyond a heavy coating of galvanization. For the longer cables used in ocean transmission rubber insulated wires have been employed of the type called Hooper's Core, already described, but it is more usual to insulate seven strands of wire, varying from No. 22 to No. 19 B. & S., with three or four layers of Gutta-percha, making the external diameter about from ¼ to ⅜ inch. This core being used singly and protected by a wrapping of tanned jute around which iron wires are spiralled in three sizes, depending upon the ultimate destination of the cables, the deep sea portions having an armor varying from eleven galvanized iron wires, each 143 mils in diameter, to ten wires, each 143 mils in diameter; the shallow water portions are armored with twelve wires, each 238 mils in diameter, the shore ends consisting of the lighter deep sea portion further armored with twelve strands of three wires, each 230 mils in diameter. In every case the armor wire is protected by two wrappings of jute yarn, impregnated with a material called Clark's Com-

*"Corrosion of Lead Pipes," Oscar Kirby; *Machinery*, London, August 15, 1896.

pound, consisting of sixty parts of mineral pitch and asphaltum and forty parts of finely ground sand, this last covering being intended to protect the armor wires from the action of salts contained in the sea water and in the ocean bed where the cables lie, the deep sea cables being about from ⅞ to 1⅛ inches in diameter, the intermediate cables 1¼ and the shore ends 2½ inches in diameter. These specifications are greatly varied by different manufacturers and by the different requirements of insulation and static capacity demanded, some of the most recent cables having much heavier conductors and Gutta-percha and a lighter armor for the portions lying in the deepest portions of the sea.

CHLORIDE OF SULPHUR AS A VULCANIZING AGENT.

By Frank W. Birchall, Chemist.

THE vicissitudes of vulcanization are pretty well known to most of those actively engaged in the processes of manufacturing India-rubber. Looking backward over the history of the subject one is struck by the singular character of the men who attacked the problems of their day.

Approaching their subject quite unscientifically they groped their way towards an understanding of the material they dealt with, stumbling over various obstacles and meeting continually with disheartening reverses.

These pioneers of an industry since grown vast in its proportions,—pioneers whose patience is at once our wonder and stimulus,—seem to have established by their painful researches the fact that, of all the substances they employed in turn, sulphur was the one needed to produce the desired effect of unalterability in heat or cold and of preservation from decomposition.

Little aid was to be had from the chemists of that time who were, indeed, themselves confronted with vaster problems involving the foundation of their science upon rational and well ascertained laws, and it became the fact that greater service was rendered by Caoutchouc to chemistry than by chemistry to the infant marvel.

The first adequate recognition of the part played by sulphur in vulcanization is to be credited to Nathaniel Hayward and Charles Goodyear in this country, and Thomas Hancock in England. Hayward dusting his goods with flowers of sulphur noted an improvement in their keeping qualities.

The same man attempting to bleach his aprons in a manner analogous to the methods in use for bleaching straw bonnets, noted a still greater improvement and thus gave rise to the process formerly known as the acid gas cure under the patents controlled by Goodyear. This seems to have been the earliest form of applying sulphur in a form different to that of the familiar yellow powder.

The inefficiency of the acid gas process soon manifested itself, it being worthy of note in this connection that its failure to cure the interior parts of even a thin layer of rubber is quite analogous to the superficial action of chloride of sulphur.

Following the acid gas process we come to the methods devised by Goodyear, sufficiently familiar to need no further mention beyond glancing at the date, which was about 1844. Two years later, or in 1846, Alexander Parks of Birmingham, England, took out a patent for vulcanizing India-rubber in the cold by immersing it in a solution of chloride of sulphur dissolved in bisulphide of carbon, coal naphtha or turpentine.

This process, commonly called "the cold cure," was taken up by Hancock and Brockedon in England, and by several in the United States.

It, however, has never reached the proportions of the older method for the reason that its action is confined to the surfaces of the goods to be cured and is somewhat difficult of control.

The chloride of sulphur used in the cold cure is known to chemists as sulphur monochloride and contains 47.4 per cent. of sulphur when pure. Its color varies through various shades of yellow to dark red, according to the method of its manufacture. It is heavier than water, having a specific gravity of 1.682 water being taken as unity. It fumes on exposure to the air and is decomposed very readily by water. The other chlorides of sulphur, of which there are two, are of interest mainly to chemists, one of them being a curiosity of the laboratory.

The fumes of chloride of sulphur are peculiarly irritating to the mucous membranes of the eyes, nose and mouth, a property by the way which is observable in several other gaseous compounds of sulphur. The irritation of sulphurous acid gas produced by a burning sulphur match is a well known case in point. Not so well known are the effects of the vapor of carbon bisulphide and of the sulphur chloride or of hydrogen sulphide, a gas which constitutes the aroma of an ancient egg. The physiological effects of these vapors are closely related, consisting in great irritation of the lining of the eyelids followed by dizziness and syncope or fainting when the action of the vapor is prolonged.

The writer has had large opportunities of observing these effects and can best describe the irritation of the eyelids by saying that the feeling is as though fine dust had been blown into the eyes. The irritation causes copious tears and temporary loss of sight, the sufferer being literally blinded by the tears and unable to raise the lids. Applications of white of egg or of grated raw potatoes prove very beneficial. After being once attacked the eyes are always more susceptible to the action of the vapors. The fainting spells are more serious and may result fatally if not guarded against. Friction of the extremities and the cautious administration of dilute ether have proved in the writer's hands very effective in cases of this sort.

A generous diet should be the fare of those who are subjected to these vapors and the most careful attention paid to personal cleanliness.

Returning now to the action of sulphur chloride upon India-rubber various explanations of its action have been brought forward.

Although without confirming his ideas by the rigorous chemical investigation necessary to speak with authority' the writer has always considered vulcanization to be a process of adding sulphur to the India-rubber molecule, with which it enters into combination, not by substitution of the sulphur for any part of the rubber molecule, but by addition pure and simple, so that the molecular weight of the vulcanized molecule is augmented by the amount of sulphur taken up.

These views are borne out by the very interesting researches of Dr. Carl Otto Weber, communicated to the Society of Chemical Industry in January, 1894.

In vulcanizing with sulphur chloride Dr. Weber found that the India-rubber simply takes up a certain amount of the sulphur chloride without losing anything itself in exchange. Furthermore he found that the chlorine of the resulting compound might be entirely eliminated without altering the character of the vulcanized product, so far at least as non analytical methods could show. Hence, quoting from Dr. Weber's own words, "These observations leave no room for any doubt as to

whether the vulcanizing action of chloride of sulphur is due to the sulphur or the chlorine of this compound, especially if we find that the state of vulcanization remains the same with or without the chlorine. Therefore although the chlorine and sulphur act simultaneously upon the India-rubber it is the sulphur to which the vulcanizing must be attributed." Just what part the chlorine plays in the reactions going on has not yet been made clear. That it aids the sulphur in combining with the India-rubber is very evident and it would be a most interesting thing to have some light thrown upon this part of the subject.

By Dr. Weber's experiments a body was produced consisting of vulcanized India-rubber having 23.8 per cent. of sulphur. Of course this is useless as a practical every day product, being over vulcanized to an enormous degree. It is interesting, however, as an example of the amount of sulphur chloride that can be taken up by India-rubber, the body referred to being made up virtually of equal parts of India-rubber and sulphur chloride.

The early experimenters with this vulcanizer found that their goods frequently became over vulcanized and it was with the idea of controlling its action that bisulphide of carbon or coal naphtha or turpentine was used to dilute the sulphur chloride and slacken its too vigorous action. Heat also was used to vaporize the sulphur chloride and the goods were exposed to the vapors, a return to the inefficient methods of the acid gas process that soon found an early grave.

The interesting features of using the diluent carbon bisulsulphide consist in these, that the rubber is rendered more permeable to the sulphur chloride and consequently is vulcanized to a greater depth and that a sufficient quantity of liquid for the proper immersion of the articles may be provided without having too large a quantity of sulphur chloride present.

Yet more interesting is the probability that definite amounts of sulphur chloride may be used in connection with definite amounts of India-rubber of a known composition whereby definite results may be uniformly looked for from each operation.

In other words the method offers opportunities for that exact chemical control which characterizes the operations of other industries and which contributes so signally to their uniform success.

Along what lines this new method of manufacture will be carried on remains to be seen. Much room will be given for the invention of suitable machinery for the handling of the volatile sulphur chloride and its diluent carbon bisulphide. Something has been done in this direction by Mr. Arthur C. Squires, the manager of the New York Vulcanite Rubber Works at 216 Wooster street, New York.

The usual trouble in handling this "cold cure" had been experienced by him, and he set himself to the task of finding a way to treat rubber with chloride of sulphur without using bisulphide of carbon as a solvent.

Mr. Squires uses heat as a means of vaporizing the sulphur chloride and brings the rubber articles into a heated atmosphere of the vapor in a closed vessel. The time of vulcanization is about the same as the old method required, while the cost is reduced to about one-half, probably in consequence of the withdrawal of the carbon bisulphide.

But there is a far wider field for the employment of chloride of sulphur in the manufacture of rubber than this devised by Mr. Squires, and certainly much more radical departures from the old methods than those adopted by him.

The chloride of sulphur cure either used cold and by solution or used hot as by Mr. Squires, is applicable to thin goods only such as balloons, waterproofs, sheeting, dress shields, etc. The future of rubber treated with chloride of sulphur is to be found in moulded goods of every required thickness or shape, and it would not surprise the writer to see in the near future rubber poured into moulds like plaster or blown like glass into every conceivable shape for every conceivable use.

RUBBER A PRIME NECESSITY OF CIVILIZATION.

From the Spectator (London).

INDIA-RUBBER is in a fair way to become one of the prime necessities of civilization. Numberless human beings, in the class which could not afford wet nurses, owe their lives to the feeding bottle. Everybody knows that in the last five years the use of pneumatic tires for cycles and solid rubber tires for horse vehicles has enormously increased our consumption of this article; but, quite apart from that more obvious fact, India-rubber is daily being introduced more and more into all sorts of machinery. Highly competent judges say that if the output could be doubled within a year, so many new applications of the material would instantly arise, that the price would not fall appreciably. As a matter of fact, the export of Pará rubber has increased within the last twenty five years from 5600 tons to 20,000 tons; and the price fetched by the best quality has risen from 2*s.* to 3*s.* a pound. It is the one jungle product which society finds indispensable. Hundreds of men have racked their brains to produce a substitute, but none has in the least degree succeeded; and such attempts must be permanently discouraged by the knowledge that India-rubber exists in limitless profusion upon known spots of the world's surface which may at any time be made accessible. In any of the swampy equatorial regions, where vegetation grows rank and sappy, so that a knife will slash through branches as if they were made of cheese, there is pretty certain to occur some one or two of the score of trees which produce rubber. Whole forests of them are known to exist in Central Africa, only waiting to be tapped. But the regions which produce them are precisely the regions most deadly to the white man; and when the rubber is made it has to come to the coast on the heads of negroes, and will not pay the cost of transport. When an accessible forest is discovered it pays like a gold mine. A tree was discovered near Lagos which was believed to produce rubber; specimens of bark and foliage went home to Kew, and the authorities pronounced it the right thing. In 1895 the export began, and amounted in the year to 2263 tons, with a value of £270,000 in round figures.

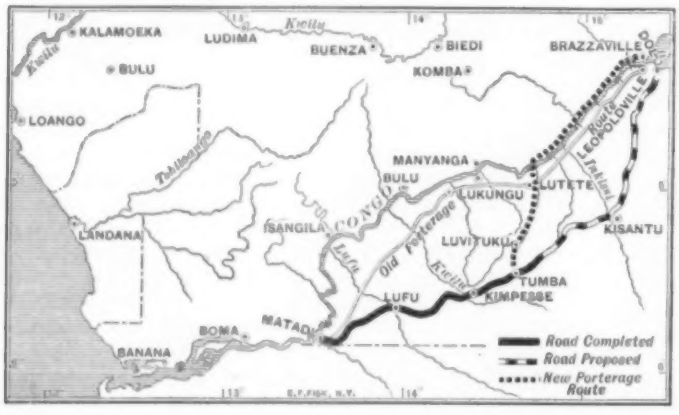
India-rubber would seem to be the one certain source of wealth now locked up in Central Africa, and perhaps the most valuable thing that the region produces or can produce. Ivory is only a fancy article, and palm oil has many substitutes. Gold no doubt exists there, but, in the first place, it is doubtful whether the pure negro can be made into a miner; and in the second, gold is to be got in regions where white men can live. It seems, therefore, as if the special function of the tropics just now was to produce India-rubber, which is wanted everywhere and cannot be grown elsewhere. No cultivation is needed; nature requires of man very little skill, scarcely any exertion, and only a reasonable avoidance of waste. Yet this is asking more than the African negro is at present able to give. The great rubber producing region of the world is the basin of the

Amazon, which yields about two-thirds of the entire annual output. The quality of this rubber is immensely superior to all others; the best Pará will fetch in England as much as 3*s.* 6*d.* a pound; the worst African goes for under a shilling. Brazil has, of course, an immense advantage in its great waterway; ocean going steamers run twelve hundred miles up the Amazon, whereas every African river, except the Congo, has a bar at its mouth, and cataracts not far distant from the coast line. On the other hand, the forests in Brazil seem even more impenetrable than in Africa. Not even such roadways as the African man paths can be maintained against the encroachment of the jungle. But the native Brazilian race is incomparably more intelligent than the negro. Their Caoutchouc is better prepared, and, what is far more important, they farm the trees as carefully as the red Indians used to farm the beaver. In Africa the rubber is generally produced, not from a forest tree, as in Brazil, but from the landolphia, which is a climbing shrub. The supply of rubber-producing plants in Central Africa is practically inexhaustible, but the number of places where they exist within easy distance of some export station is small, so far as our present knowledge goes. Yet for the present, speculators will probably hasten to be rich, and if they hit upon a forest, will treat it like a mine, anxious simply to take out the maximum at the minimum of cost.

Whether our state, or any other, will ever make this a great branch of its tropical forestry remains to be seen. The Germans, with their usual thoroughness, have a strong scientific staff at the Cameroons. The English, in their usual makeshift way, content themselves with sending home to Kew for suggestions. But the government of India have at least tried an experiment upon the great scale. No private firm, however wealthy, would embark upon the cultivation of India-rubber; the trees take a matter of twenty years before they can produce a pennyworth. In addition to that, cultivation must occupy a huge extent of ground of such a nature that no European can enter it during the rainy season, and where the growth is so thick that twenty men might be tapping trees within a mile of the ranger, and he none the wiser. Nevertheless, the Indian government have a nursery of Pará rubber trees in Assam, extending over two hundred square miles, which will in time begin to yield; and if any department can control such a farm, the Indian woods and forests will.

THE NEW CONGO RUBBER ROUTE.

WITHOUT repeating the statistics published in this journal from time to time in regard to the progress on the Congo railway, attention may be called to a map (adapted from *Le Mouvement Geographique*) which shows at a glance the relative distances over which the road has been completed and over which the greater part of the requisite work remains to be done. It should not be forgotten, by the way, that, as already pointed out in THE INDIA RUBBER WORLD, the work on the first section was much the more expensive, and that the construction is now being pushed forward more rapidly than would have been possible at the beginning. Our chief interest in the subject being in the prospect of opening a shorter and cheaper route to the great Congo rubber field, it may be noted here that already the railway has facilitated an increase in the output of rubber from that section. The map shows not only the progress made on the railway, but a comparison of the old and new porterage routes. Since Tumba, instead of Matadi, has been the destination of rubber caravans from the upper Congo, the cost of porterage has been lessened and the route shortened somewhat—both of which have been favorable conditions for the India-rubber trade, foreshadowing what will be the result of completing the railway and rendering unnecessary the employment of porters between the upper and lower cataracts.



INDIA-RUBBER IN LIBERIA.

THE following reference to India-rubber in Liberia is contained in the "Third Report to the Board of Managers of the New York State Colonization Society, by O. F. Cook, professor of natural sciences in Liberia College," lately published:

"Several plants contain rubber, but the trade has been abandoned for the last few years. Recently the factory of the Woermann company is attempting to start business again by buying the juice and coagulating it by a chemical process. The cultivation of some of the rubber-bearing plants is entirely possible, and is being undertaken in some places. The main source of rubber in Liberia was a vine (*Landolphia*), which has a habit of strangling the tree on which it grows by winding itself around repeatedly, and sending out numerous branches which coalesce with each other, thus forming an irregular grating, so to speak, over the trunk of the supporting tree. The vine is thus able to stand alone when the tree rots away, and may itself become a tree to all appearances."

IN one of the early numbers of THE INDIA RUBBER WORLD mention was made of a company registered in England for exploiting India-rubber on a large scale, but this was subsequently wound up. The "dark continent," by the way, has afforded a great opportunity for the promoting of so-called rubber-trading companies, with large capital on paper, conducted no doubt chiefly with a view to benefitting their promoters. Only a month or so ago The Yorubaland Rubber, Trading, and Exploring Corporation was registered, with $603,000. Yoruba is the *hinterland* beyond Lagos. There has also been registered a company under the style of the African Rubber Explorers (Guarantee).

GERMAN rubber-manufacturers are making their influence felt in the export trade of their country in every direction. Thus within three years their exports to France have more than doubled, while the amount of French rubber goods consumed in Germany has remained almost stationary. Likewise the exports of German rubber goods to Italy has largely more than doubled during the past five years. Germany now supplies about 54½ per cent. of the rubber goods imported by Italy.

NEW GOODS AND SPECIALTIES.

PINK and white dental vulcanite have been the subject of numberless experiments by American rubber manufacturers, yet it is claimed that the whole secret of the manufacture of these goods is not possessed this side of the ocean. However this may be, it is certainly a fact that many of the makers of these goods import a compounded stock as the basis of their finished gum. Within a week a prominent dentist journal has announced that the goods were now produced in this country from start to finish. On the heels of this news comes fuller information from the manufacturer himself accompanied by samples of both the vulcanized and unvulcanized product, and THE INDIA RUBBER WORLD is the recipient of both. The samples are certainly very fine, and are supplied by Mr. A. C. Squires, the manager of the New York Vulcanite Rubber Works, 216 Wooster street, New York.

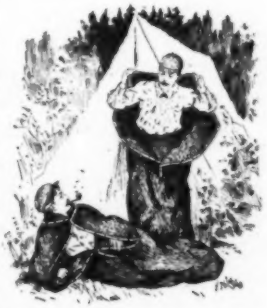
THE MAGIC OIL-WATER ATOMIZER.

AN atomizer that may be used for oils and that is thus adapted for any other kind of liquid is the Magic No. 45. The cut shows very clearly the neat and sensible shape of both bottle and fittings. The atomizer is designed primarily for use in nasal affections and is adapted to atomize liquid Vaseline, Albolene, Benzoinal, Thymol, or any of the medicinal oils that may be prescribed. The rubber parts are of the very best of stock and workmanship, the hard rubber spray pipe being especially ingenious and at the same time simple and effective. Manufactured by the Davol Rubber Co., Providence, R. I.

DAVOL RUBBER CO.

A COMFORTABLE CAMPING-BAG.

EVERY camper-out who cares for comfort and who kens of its existence carries the Kenwood camping-bag. It is almost a necessity if one would be protected from cold or moisture. On the trail the bag holds the camp outfit. In camp it becomes a blanket in which one rolls up, and keeps warmer with less weight and less bulk than with the use of any other kind of cover. The bag is quickly adjusted and stays so without the use of buttons or strings. A rubber over-bag has been made to go with the camping-bag, thus making the latter waterproof, as well as adding greatly to its warmth. The Kenwood camping-bag is made by F. C. Huyck & Sons, Albany, N. Y.

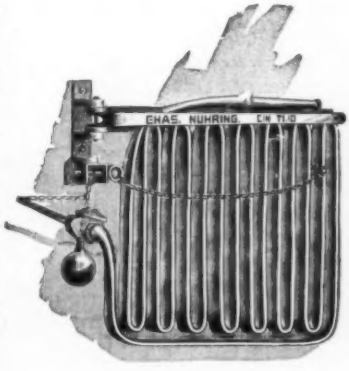


THE PERRY PNEUMATIC SADDLE.

ONE of the most recent discoveries in the art of improving the bicycle has been that the chief use of the saddle is to sit on it. When the real purpose of this part of the wheel came to be appreciated, manufacturers made persistent efforts to fit the saddle to the rider. The anatomy of man was studied, and in place of devising new springs, attention was concentrated on the seat. After pneumatic tires—and a long time after, it seemed—came the pneumatic saddle. When an approximately correct shape had been attained, the saddle invariably was found to be either too hard or too soft. Thus the rider was unable to sit his wheel properly, or to hold his seat. The Perry saddle made by the Pneumatic Saddle Company of Chicago, seems to have overcome all these obstacles. It is comfortably soft, even when inflated. If, for any reason, the air is let out of the cushion, the saddle is still more easy to the body than the ordinary rigid saddle, and in this condition it can be ridden with safety.

THE NUHRING HOSE RACK.

MANY devices are on the market for holding hose ready for instant use in case of fire. The latest and so the manufacturer claims the best is the Nuhring. Its points of excellence in brief are that the hose is hung up and is neither reeled nor folded. This not only allows the air to circulate in and about all parts of the hose, thus preventing mildew, but as there is not a particle of weight on the hose the layers cannot become kinked. Further than this it is always ready for use, and in running off it cannot become kinked or twisted. An automatic valve is a feature of value, its office being to let on the water at the right moment, rendering it unnecessary for the person unreeling to have to return and turn a valve. Manufactured by Charles Nuhring, 907 Walnut street, Cincinnati, Ohio.



THE RULER OF RULERS.

THIS ruler is made of highly polished hard rubber. The handle being reversible allows the use of either edge. The slant of the handle is such that the work is in plain sight all of the time, and does away with all peering over the knuckles or knocking against the finger tips. The ruler may be placed on or removed from book or paper without leaving a trace of finger marks. As there is no need for the fingers to touch its edges

they do not become soiled with ink. A narrow strip of soft corrugated rubber cemented to the bottom of the ruler prevents its slipping on a rounded surface or at the bottom of a page, while the V shaped ruling edge is sufficiently high to prevent blotting. The reverse or beveled edge makes an excellent paper cutter, or is useful in tearing off checks and drafts. It is made in two sizes, 12 inch and 15 inch. Manufactured by the Goodrich Hard Rubber Co., Akron, Ohio.

CARPENTER'S CYCLIST SUPPORTER AND BRAKE.

THIS little arrangement is made of strong elastic and is worn around and under the arms, the hooks catching under the saddle. When properly attached, if the rider leans forward it gives him an extra force on the pedals. It is said to give additional power in riding up steep grades, and as a brake is a perfect success, as it prevents one from being lifted off the seat when back pedalling. It can be worn with a coat or sweater, the hook can be bent to fit any saddle, and when the rider sits upright the article is not in use, as the hook drops out of place. Manufactured by W. F. Cushman & Co., 711 Boylston street, Boston.

THE HOOD BULL DOGS.

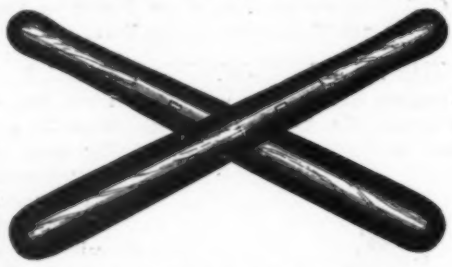
THE bull dog toe in rubber shoes has already been illustrated and fully described in THE INDIA RUBBER WORLD. Almost every company making rubber boots and shoes is to-day making this toe. The reason for introducing it again in these columns is to show what is made by the newest arrival in the field of rubber footwear manufacture, the Hood Rubber Co., whose factory at East Watertown, Mass., is described elsewhere in this issue. The illustrations give a very fair idea of the shoes, and the shoes themselves bear the impress of first quality in every particular.

TYPEWRITER FINGER-TIPS.

THE keys of typewriting machines are generally made of glass or metal, and the tapping of these unyielding surfaces for considerable lengths of time day after day not only frequently causes shock to the nervous system, but actual soreness of the finger ends. To prevent this is the purpose of the typewriter finger tip illustrated herewith which consists of a kind of thimble of rubber, corrugated on the inner surface to prevent shifting on the finger, and with a cushion tip, through which are small holes to permit ventilation at the finger end. This is a contrivance which cannot fail to commend itself not only to the typewriter operator, but the employer as well, for a much greater quantity of writing can be done more rapidly with these tips than when they are not used. The typewriter finger tips are placed on the market by Benjamin Mottram, 268 Forty-sixth street, Brooklyn, N. Y.

A RUBBER COVERED POLICE CLUB.

WHEN Dr. Abiel W. Nelson of New London, Conn., invented his "humane police club," he did a distinct service to the cause of humanity. No one but the police themselves know how prone they are to use more force than is necessary in making a difficult arrest. That is no one excepting the unfortunate person whose head is cracked because in his drunken stupor, perhaps, he wasn't quick enough in minding the officer. Five years ago it occurred to the doctor that a club which would be elastic enough to avoid fracture while it stunned for the time being, would be a vast improvement on the night-sticks in general use. The result of this idea was a club with a hickory



core and an elastic envelope of soft India-rubber. As manufactured and on sale these clubs are of two sizes, 11½ and 13½ inches long, in the wood core, and seven-eighths of an inch in diameter, making the full lengths of the clubs 12 and 14 inches. The surface can be like that of any fine rubber or can be finished so as to slip into the pocket as easily as polished wood. The club was tried on animals and on cadavers before it was offered to the trade. Since then it has been commended by many police superintendents as strong, effective, safe, humane and nearly indestructible. Manufactured by Tower & Lyon, 95 Chambers street, New York.

THE RUBBER YIELD OF MEXICO.

MEXICO remains in the field as a rubber-producing country, although recent years have shown a falling-off as compared with the yield formerly reported. But according to the table given herewith, courteously compiled for THE INDIA RUBBER WORLD by Mexican customs officials, it will be seen that during the past three years, more India-rubber has been exported from that republic than in the few years immediately preceding. The values are expressed in Mexican silver, for fiscal years ending June 30:

YEAR.	Pounds.	Value.	YEAR.	Pounds.	Value.
1888-89....	289,261	$124,547	1892-93....	122,058	$51,829
1889-90....	300,685	97,246	1893-94....	168,026	58,821
1890-91....	202,951	72,559	1894-95....	189,169	91,685
1891-92....	141,303	47,584	1895-96....	182,474	82,111

The total output for the eight years covered by this table was 1,595,827 pounds, or a yearly average of 199,728 pounds. According to Mexican statistics for the first five years, and figures obtained from Washington for the other three, the share of this rubber imported by the United States amounted to 1,243,017 pounds. The remainder went to Great Britain, France, and Germany, together with small quantities shipped to Colombia and from there to the rubber-manufacturing countries.

BRIEF ABSTRACTS OF RECENT RUBBER PATENTS.

PATENTS for the month past, although few in number, are of exceeding interest. After one gets through with the minor inventions that cluster about the tire business, and which this time embrace a repair tool, two schemes for plugging punctures, a repair needle, an automatic tire pump which pumps air into the tires all the time the wheel is in motion, we come to tire patents themselves. These consist of a pneumatic tire with metal springs throughout its interior, a tire with loose pieces of puncture-closing material floating in liquid or air within the tire (an English invention the American rights for which are assigned to the partners in the firm of Morgan & Wright individually), and last a method for fastening rubber tires to rims for use on vehicles.

In mechanical goods, one would not need to be told that the hose season was here, for the first patents to be noted are a hose support, two hose nozzles, one of which is an invention of Cornelius Callahan, a new type of hose reel, and a lawn sprinkler. Air brake hose receives the attention of two inventors, each of whom produces a dust guard for the hose when in use. An invention in the line of mechanical goods is the conveyer belt apparatus, patented by Thos. Robins, Jr., and is of special interest just now as indicating the development of conveying by means of rubber belts instead of the link belt system.

Druggists' and stationers' sundries produce this month only a nursing bottle and an eraser. In miscellaneous inventions there is to be found a machine for working rubber, patented by Frederic Hadfield, of Woonsocket, R. I., and a hose making machine by R. T. Burchell, of Trenton, N. J. It is impossible to decide upon the merits of these machines from the brief claims noted in the patent office reports, but it is interesting to all rubber manufacturers to note that new processes for the mechanical handling of rubber in mass or in process of manufacture are still produced. Another invention under this heading is one by a German for an elastic bed-plate of India rubber. The leading trade-mark for this month is one secured by the Boston Woven Hose & Rubber Co., which bears the imposing title A Compressible Tubular Holder for Plastic Cementitious Material, a title that may lead the unthinking to believe it refers to something produced in fifty-foot lengths at least.

TIRES.

No. 570,664.—Tool for mending punctures in Pneumatic Tires. Arthur Heywood and Arthur T. Heywood, Chicago, Ill.

A repair-tool for pneumatic tires, comprising a rigid tube, bevel-pointed at one end and adapted to receive a headed plug, and a plunger for expelling the plug from the tube.

No. 570,942.—Device for closing tube punctures. William B. Merritt, Braintree, Mass., assignor of two-thirds to George W. Arnold and Edward d. Kinney, Brooklyn, N. Y.

The combination of a perforated rubber tube and an air-tight plug for the puncture or perforation, the plug consisting of a tapering part or portion, a disk-like head or enlargement therefor having means for connecting with a driving-tool and a helical groove in the surface of the tapering portion extending from a point at or near said head to a point at or near the opposite extremity.

No. 571,001.—Automatic Pump for Pneumatic Tires. Thomas M. Jenks, Galesburg, Ill., assignor of one-fourth to Edward W. Jenks, Chicago, Ill.

In combination, the wheel, air-pump with extended piston-rod cam disk, a follower pivotally connected indirectly with the piston-rod, and a spring for holding the follower out of engagement with the cam-disk.

No. 571,108.—Repair-plug for Pneumatic Tires. Daniel W. Colhapp, Chicago, Ill.

A repair-plug for pneumatic tires, etc., having a head and shank, the shank being provided with a duct for the passage of solution through the shank to the interior of the tube being repaired.

No. 571,422.—Needle for repairing punctured bicycle-tires with cement. Charles F. White, Denver, Colo., assignor of one-third to Robert Gerwing, same place.

The combination in a needle for mending punctured tires with liquid cement of an instrument having a solid point and eye in the point adjacent to its end, a chamber in the needle extending from its head to its eye, one or more steps of different diameters adjacent to the point and blending therefrom in increased diameter and in successive order adapted for various sizes of punctures, a plunger having a piston fitted to reciprocate in the chamber, a stem on the plunger, a head or knurled finger-disk on the stem, a cap secured to the head of the needle against displacement and arranged to extend above it, a diametrical opening through the side of the cap above the needle adapted for a cement-inlet to the chamber in the needle and a hole in the cap adapted to fit the stem of the plunger.

No. 571,444.—Bicycle-tire. Charles A. Hussey. New York, N. Y.

In a hollow tire for bicycles or other vehicles, a series of spring-steel formers or supporters arranged a slight distance one from the other and connected in a series by an elastic band as shown, the formers being divided at points opposite the central point of the tread and having inwardly-curved and wedged-shaped shoulders, with a rubber envelope or cover secured around the formers and having a complementary wedged-shaped portion.

No. 571,872.—Tire-fastening. Angus W. Williamson, Philadelphia, Pa.

A tire-fastener comprising a felly, a resilient tire located on the felly, a rod holding the resilient tire, the ends of the rod being located adjacent to each other, and a loop-hole connected with the ends and passed through the felly.

No. 571,947.—Pneumatic Tire. Hugh Faulkner, Leicester, England, assignor by mesne assignments, to Fred. W. Morgan and Rufus Wright, Chicago, Ill.

A pneumatic tire, containing within the air chamber, small pieces of puncture-closing material and a liquid, the puncture-closing pieces being free to move in the liquid and to distribute themselves automatically.

MECHANICAL GOODS.

No. 570,816.—Support for Reels or Hose. Charles W. Ruby, Brooklyn, N. Y.

The combination with a conduit having a discharging-nipple, of a hood rotatably mounted upon the nipple to open and close the same and provided with means to connect with a hose, and a hose support detachably fitted upon, solely supported by, and serving to rotate the hood to open and close the nipple.

No. 570,903.—Hose-nozzle. Cornelius Callahan, Canton, Mass.

A nozzle for fire-hose, comprising an integral body part having a valve controlled full-stream port, and a duct with converging walls leading thereto, and also formed with a boss through which extends a limited stream port, in combination with a rotatable female frusto-conical coupling adapted to be secured to the hose extending into the duct and having its inner end threaded therein, the coupling having an aperture or duct adapted to register with the limited-stream port and means for limiting the movement of the body relatively to the coupling.

No. 511,604.—Conveyer-belt Apparatus. Thomas Robins, Jr., New York, N. Y.

A belt for conveyers and other uses presenting in cross-section, a wearing-face, and a body portion or backing which is

thicker at the edges and thinner and more flexible at one or more points nearer to the middle of the belt, the belt thus combining relatively stiff edges with one or more relatively flexible points between the edges.

No 571 701.—Hose-Reel Thomas N. Smith, Independence, Mo., assignor of one-half to William A. Symington, same place.

In a hose-reel the combination with a suitable framework, of a reel proper or drum journaled rotatably therein, and comprising a shaft, rings mounted upon the shaft and provided with diametric cross-bars, a cylinder or drum mounted upon and connecting the rings, and a hook-rod to clasp the hose against the cylinder or drum, and extending through holes therein, and having one of its arms also extending through a guide loop of the cross-bar or one of the rings.

No. 571,708.—Dust-guard for Air-brake hose couplings. William Y. Thompson, Fort Howard, Wis.

In a dust-guard for hose-couplings, the combination of a gasket consisting of two annular sections of the same internal diameter but of unequal external diameters, and an elastic diaphragm disposed between the annular sections and secured thereto and having a plurality of radial slits extending from its center to near its periphery.

No. 571,799.—Hose-Nozzle. Adrian J. Reynolds, Nashville, Mich., assignor of one-half to W. S. Powers, same place.

A nozzle having a hollow hemispherical shell at one end in combination with a collar conforming upon its inner surface to the exterior contour of the shell, a bushing removably fitted in the collar, and a spring interposed between the bushing and the nozzle and having its end coils reduced in diameter to fit within the shell of the nozzle.

No. 572,000.—Lawn-Sprinkler. John H. Fay, Grand Rapids, Mich.

The combination with a nozzle of a pivot projecting from the side of the nozzle, and a spraying device mounted on the pivot and composed of a plurality of flat imperforate fingers of different widths which radiate from the pivot in the same flat plane inclined with relation to the longitudinal axis of the nozzle, the spraying device being rotatable on the pivot to place any one of the fingers of different widths in an inclined plane in the path of the stream flowing through the nozzle, or to place any two of the fingers upon each side of the nozzle to permit an unobstructed flow of water from the nozzle between them.

No. 572,009. Strainer for Air-Brake Hose-couplings. George H. Herbert, Anaconda, Mont.

The combination with an air-brake hose-coupling member and a gasket arranged in the opening thereof and held in place by a removable cap, of a strainer arranged wholly in rear of the face of the coupling member and consisting of a recticulated disk seated upon the inner end of the gasket and embedded therein by the cap whereby dust is excluded when the coupling member is disconnected, the gasket forming a yielding seat for the strainer.

DRUGGISTS' SUNDRIES.

No. 571,245.—Nursing-Bottle. William L. Roth, Washington, D. C.

In a nursing-bottle having plain diverging sides, the combination with a nipple having a constricted neck, a porous filtering body located above the neck, and projecting side knobs arranged below the neck to facilitate adjustment.

STATIONERS SUNDRIES.

No. 570,186.—Eraser, Hiram B. Collins, Frankfort, Ind.

An eraser consisting of a handle having a heart shaped head formed on its end, notches cut into the sides of the neck under the head, a strip of abrasive material mounted on the head with its ends extending around the corners thereof and down alongside the neck, over the notches, clamping-jaws secured at one end to the sides of the handle, and arranged so that their points or jaws proper, will enter the notches in the neck, and a sliding ring mounted on the handle over the jaws, by the operation of which the jaws are forced in to impinge tightly upon the strip and force it tightly and securely into the notches.

MISCELLANEOUS.

No. 571,226.—Machine for working rubber. Frederick Hadfield, Woonsocket, R. I.

An apparatus for feeding soft rubber comprising a frame, a pipe adapted to be connected with a source of steam supply and having the transverse portions, feed rolls journaled on the transverse portions of the pipe, and a pan arranged below the rolls and pipe and adapted to deflect the heat against the rubber mass as it passes over the rolls.

No. 571,261.—Hose-machine. Robert T. Burchell, Trenton, N. J.

In a hose-machine, the combination with a revolving mandrel, of a shaft journaled parallel therewith and formed with a helical thread, the semicylindrical traveler engaging the shaft and supported and traveling thereon, the hanging having lateral arms whose upper ends are secured to the top portion of the traveler a roll journaled in the hanger, and means for putting the axis of the roll under more or less friction.

No. 571,618.—Elastic Bed-plate. Paul Knoch, Adlershof, Germany, assignor to Heinrich Philipp Knoch, same place.

A method of forming supporting plates, the method consisting in first impregnating a yielding plate with a solution of India rubber the solution being permitted to extend partly into the plate, and second in vulcanizing the solution of India-rubber so as to form a hardened surface for the plate and so as to leave the remainder of the plate in its original yielding form.

No. 572,079.—Mucilage-bottle. Stephen O. Trescott, Pittsburg, Kans.

A mucilage bottle or receptacle, comprising a compressible elastic hollow body, and a tip provided with a bore communicating with the interior of the body and adapted to serve as an outlet for the mucilage when the receptacle is compressed.

TRADE-MARKS.

No. 28,946.—Nasal Syringes. William H. Armstrong & Co., Indianapolis, Ind. Filed June 30, 1896.

Essential feature.—The word "Success" with a cut representing a portion of the human face with the nasal organs in section. Used since September, 1888.

No. 28,974.—Pneumatic Tires of the Single-Tube Variety. The Hartford Rubber Works Co., Hartford, Conn. Filed Aug. 17, 1896.

Essential feature.—A symbol comprising a representation of a pneumatic tire in annular form, provided on opposite sides with an outspread wing. Used since July 1, 1896.

No 29,029.—Rubber Syringes and Articles of Like Character. Lanman & Kemp, New York, N. Y. Filed September 25, 1896.

Essential feature.—The letters "B B B." Used since September 28, 1886.

No. 29,031.—Composition for Repairing Pneumatic Tires. Boston Woven Hose and Rubber Company, Boston, Mass., New York, N. Y., Chicago, Ill., San Francisco, Cal., and Cleveland, Ohio. Filed Sept 18, 1896.

Essential feature.—The word "Vimoid." Used since July, 1896.

No. 29,062. Pneumatic or Solid-Rubber Tires. L. C. Chase & Co., Boston, Mass. Filed Sept. 19, 1896.

Essential feature.—The word "Chase." Used since July 1, 1896.

No. 29,137.—Cement for Rubber Goods, Especially for Bicycle-tires. James E McWilliams, Hubbardston, Mass. Filed Sept. 30, 1896.

Essential feature. The word "Biko." Used since January 1, 1896.

No. 29,153.—Compressible Tubular Holders for Plastic Cementitious Material. Boston Woven Hose & Rubber Co., Boston, Mass., New York, N. Y., San Francisco, Cal., and Cleveland, Ohio. Filed Oct. 8, 1896.

Essential feature. A red or reddish colored tip or end of a compressible holder. Used since September 1, 1896.

DESIGN PATENTS.

No. 26,205.—Lawn-Sprinkler Body. Horace Falk Neumeyer, Macungie, Pa., and Jonas Francis Young, Niagara Falls, N. Y. Filed Sept. 8, 1896.

No 26,338.—Elastic Tire. Jesse Lyman Dann, Columbus, Ohio. Filed Oct. 12, 1896. Serial number 608,656. Term of patent 14 years.

Claim. The design for an elastic tire.

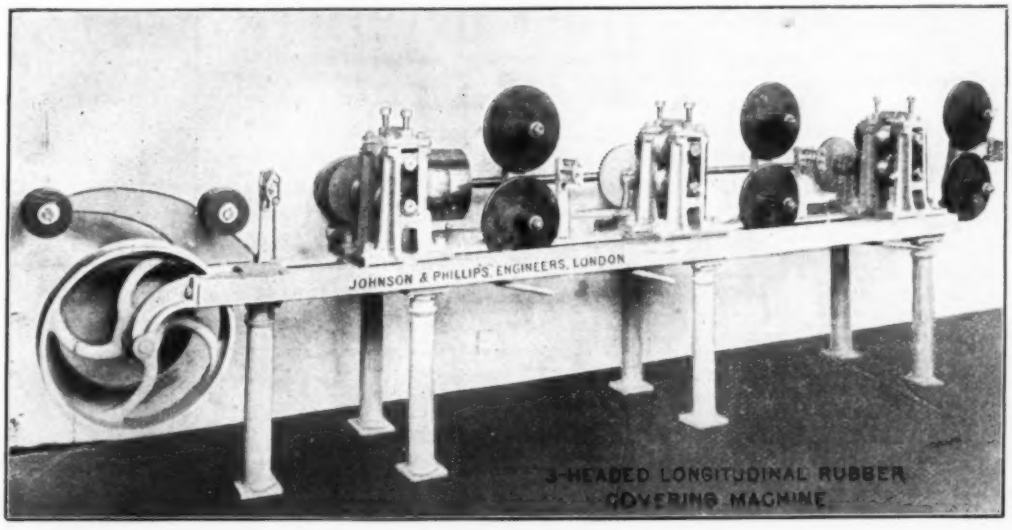
MACHINERY FOR CABLE-MAKING.

WHILE the existence of the great system of submarine cables now almost encircling the globe depends primarily upon the discovery of suitable insulating gums and their proper adaptation to insulation purposes, no small share of credit belongs to the inventors of the various ingenious machines by means of which immense lengths of cable are turned out with such uniformity of size, weight, and quality, to say nothing of the advantage in cost gained from such mechanical aids. It would require a considerable volume to describe even in outline the various machines now offered in the market for use in the manufacture of submarine cables. There is, for instance, the cable-sheathing machine, the office of which is to "sheath" cables with iron or steel wires, at the same time covering them with tape or yarn, and insulating compounds. Probably the largest machine of this kind in the world, which has been in successful work for several years in the factory of a large French cable-manufacturer, is fitted up for sheathing "shore-end" cables. It is capable of sheathing the cable with wires .425 inch in diameter; it is constructed to carry eighteen bobbins, 36 inches in diameter, each of which will hold about one ton of wire; the total weight of the machine, with the bobbins so loaded, is seventy tons; and the ground-space required is 88 x 16 feet. We have no record of the capacity of the machine referred to, but two smaller machines, built on the same model by the same manufacturers, for sheathing "intermediate" and "deep-sea" cables, have a capacity for covering three miles and four or five miles, respectively, per working day of ten hours.

It is not intended here to catalogue all the various machines used in the manufacture of submarine cables. But a machine for covering the sheathing wires before they are closed around the cable—each having four heads which may be stopped independently of each other, separate compound tanks for each wire, and change wheels for varying the lay of the tape from about ¾ inch to 3 inches—may be mentioned for the purpose of stating that a single English firm turned out twenty-five of them in seven weeks, their combined capacity being 75 miles of covered wires per hour. It is evident, from such a showing, that the industry is one of great importance. By the way, there is also a demand for machines for sheathing electric-lighting cables and wires for other purposes, the aggregate length of which exceeds that of all the submarine cables manufactured.

What is of most importance to the India-rubber trade, however, is the line of machinery for covering the single-wire or stranded copper conductors with pure rubber tape; the machine for covering six or twelve wires at a time with white or black compound rubber, with an average output of from 12 to 20 miles per day of ten hours; and various other forms and dimensions of machinery for applying insulating materials. Each new style of electric conductor seems to call for and result in the manufacture of a special machine. Thus there has been manufactured recently for the British postal telegraph department a machine for making 7-wire Gutta-percha cables interlaid with yarns, the whole covered with compound tape, in one operation.

In an accompanying illustration is shown the three-headed longitudinal electric-wire and cable covering machine manufactured by Messrs. Johnson & Phillips, of London, England, who are practically the pioneers in this class of machinery. It is arranged for putting on simultaneously three coats of rubber, viz.: one of pure, two of compounded, or three layers of compounded. It is the machine above referred to for covering six or twelve wires at a time. It is designed to displace the old type of machine in which the India-rubber is squeezed around the wire through dies.



3-HEADED LONGITUDINAL RUBBER COVERING MACHINE

While reference has been made here only to machines for the manufacture of cables and insulated wires, there is a constant demand for special machines for loading submarine cables on the cable ships, for laying cables, and for keeping them in repair. Altogether the successful manufacturers of these machines—whose profits ought to be very comfortable, in the absence of widespread competition—owe no small debt to the India-rubber inventors whose work first paved the way for the use of the machines.

TEREDO AND GUTTA-PERCHA.

THE "Teredo," which is a little submarine borer that eats almost anything except lead or copper, has recently distinguished itself by boring holes through Gutta-percha. This report is from the French telegraph department, who took up a cable that had been down some two years and discovered that the Teredo had not only eaten through the jute and the cotton but had passed into the Gutta-percha baring the copper wires. The expert electrician advises that the cotton and jute be permeated with sulphide of copper. This would be a distinct disadvantage with the insulated wire that was rubber covered but would probably have no effect on Gutta-percha.

THE RUBBER ERA.

Vol. I.—No. 13. SATURDAY, DECEMBER 4, 1880. YEARLY SUBSCRIPTION $2.

INDIA RUBBER AND GUTTA PERCHA.

... series of six lectures delivered by THOMAS HANCOCK, F. G. S., before the Society of Arts, London.

LECTURE III.—(Continued.

EFFECTS OF SULPHUR AND OTHER CHEMICALS UPON RUBBER.

It is a matter of considerable importance that the sulphur employed for mixing with caoutchouc should be free from all traces of acid, and also from the moisture which acid vapours of sulphur tend to absorb from the atmosphere. Ordinary flowers of sulphur—prepared by passing sulphur vapor into large chambers constructed of masonry, so that this vapor shall condense into minute crystals resembling ice—is almost invariably acid in its reaction, an unpleasant acid sulphurous acid being formed by the oxidation of the sulphur. This acid may be removed by washing the flowers of sulphur with an abundant supply of water, and then drying it at a gentle heat.

Here is a sample of ordinary commercial flowers of sulphur, and here is some of the water which has been washed and dried. I will put a little of each on a sheet of blue litmus paper, and then moisten them with alcohol. You see that where the unwashed sulphur was placed, the color of the litmus paper has changed to red, owing to the action of the acid, while the color of the the litmus paper has not been in any way altered by the washed sulphur. All samples of sulphur ought to be tested in this way before being employed for mixing with India-Rubber. Powdered roll sulphur is very often made use of, and it has not as much tendency to be acid as is the case with flowers of sulphur.

The so-called wash of sulphur—or ... tated sulphur—exists in a very fine state of division, and, as far as this circumstance is concerned, it is especially adapted for mixing with India-Rubber; but, on the other hand, it is expensive, and is liable to be damp.

All excess of sulphur in vulcanized Rubber beyond that actually required is undesirable, but, in order to insure perfect vulcanization, it is necessary to employ considerably more than that which actually combines with the Rubber. This excess sometimes effloresces out on the surface, becomes acid, and leads to the destruction of the Rubber. It appears also sometimes as to combine with the Rubber so as to make it brittle and useless. In the case of articles possessing no great degree of thickness, the greater part of the injurious excess of sulphur may be removed, either by boiling them in a dilute solution of caustic soda, or by means of a solution of sodium sulphite. Another method of producing vulcanized Rubber, which shall be free from any great excess of sulphur, consists in replacing a considerable proportion of the sulphur originally mixed with the caoutchouc by a metallic sulphide.

The sulphide of antimony is that which is most extensively employed at the present time, the use of this having been claimed by Charles Haswell in a patent dated January 12, 1848; while, in a patent dated February 19, 1847, he fully recognizes the fact that free sulphur ought to be employed in conjunction with the sulphide of antimony. Sulphide of antimony for the Rubber manufacturer is prepared by boiling the native sulphide in a solution of caustic soda, and precipitating the solution thus obtained with a slight excess of hydrochloric acid. Here is an alkaline solution of the native sulphide, and you see that when I add hydrochloric acid to it, an abundant orange precipitate is produced. This, when washed and dried, is the "sulphurated antimony" which you often see.

The sulphide of antimony thus prepared, contains, under ordinary circumstances, a certain proportion of free sulphur; but, in order to obtain the best result with the sulphide of antimony, it should contain as much as 25 or 30 per cent. of sulphur in an uncombined state. This can be brought by adding the requisite proportion of sulphur to the caustic soda in which the original native sulphide is dissolved. The well-known red Rubber is vulcanized by means of the sulphide of antimony, and the superior qualities of this kind of Rubber over the ordinary gray article are generally recognized by the public. The absence of any considerable amount of free sulphur renders it less liable to decay under the influence of time and light, while it is less subject to destruction by fatty matters than Rubber containing an otherwise excess of free sulphur. The quality of commercial red Rubber is, however, somewhat variable, and I have met with samples which were scarcely vulcanized at all, the sulphide of antimony employed being probably deficient as to the amount of free sulphur present. When the sulphide contains from 20 to 30 per cent. of sulphur, it is generally not necessary to mix more than 15 to 20 per cent. of the sulphide with the Rubber; but when a sulphide of antimony containing less free sul... phur is employed, it is possible ... larger proportion to the Rub... ber. No manufacturer sho... sample of precipitated sulp... without first ascertaining ... proportion of free sulph... Extra sulphur may be r... milk of sulphur, but th... satisfactory as taking t... with. Other sulphides, ... arsenic sulphide, or ... ally employed as va... in order that they may ... factory manner, it is n... sulphur to be present; ... free sulphur should alw... in order that the vulcan... of certainty, rather that... of haphazard guess wo... easy or vexatious mixing agent ought, ... advise ... sulphur.

The action of these ... They have but little va... selves, but they enable ... may be present to com... in other words, they ... large excess of sulph... united with the Rubb... Well, then, the use of t... it impossible to avoid t... excess of ununited sul... goods.

Some of the sulphides ... sparentness ... may be mentioned ... the alkalies and of t... articles made of this ... perfectly vulcanized ... which consists in expos... of a solution of the ... solution at a temperat... Centigrade.

Among Messrs. Forst... some are many sulphid... vulcanizing agents, and ... by intended for use as ... latter being, probably, ... sulphur. Among the spe... the antimony vermillion ... mentioned, but such a vulcanizing ... sulphide of antimony, wh... pared as a vulcanizer, as ... such a way as to insure ... tion, this being a matter ... pertinent. Again, we h... mentioned, a bright yellow ... may be added to the Ru... as it does not vulcanize ... tent; hard hydrocarbon ... plunged in the melting ... zinc sulphide, a white ... may be added to the ... to the Rubber; sine-sulp... ing material, which is ... last coating an opened ... the property of absorbi... resists sulphuring up... sulphur from the more ... are beneath.

When articles made ... may not shrink—are sub... place, and exposed to a ... 110 deg. centigrade for ... as much as ten per cent. of sulphur is absorbed by the caoutchouc, and this absorption is facilitated by rubbing the powdered sulphur on the surfaces of the caoutchouc. This method of sulphuring cut sheets, and articles made from cut sheets, is of considerable practical utility to many users, and the goods so charged with sulphur may be cured in the ordinary steam vulcanizer.

COLD CURING PROCESS.

Parkes' cold curing process, totally referred to in a previous lecture, is one of the greatest things existing in the whole Rubber trade. Here is a piece of cut sheet Rubber, which I now dip for an instant in a mixture of one part of disulride of sulphur, and forty parts of carbon disulphide; after which I lay it for a minute or so in a tray covered with French chalk and ... heated to about 60 deg. centigrade. You perceive that the Rubber is now perfectly cured, and ... manufacturer of hospitalism, which will be referred to in the next lecture.

Oils and fats exercise a very destructive action on India Rubber, more especially when the caoutchouc is unvulcanized. I am enabled to show you a very interesting specimen illustrative of this. It consists of a piece of one of the caoutchouc pipes employed to lead gas into the trains at the Bennerswith Station, and the pipe from which this specimen has been cut was placed in immediate proximity to the stopping-point of the engines. You see how deeply and thoroughly the pipe is corroded and destroyed by the action of the oil from the engines, while the other pipes in the station are in excellent preservation.

Some of the conditions which are favorable to oil-rendering powers, in the case of vulcanized caoutchouc, are as follows:

THE Rubber Trade Reporter.

Devoted to the Interests of the Rubber Manufacturing and Jobbing Trade. Circulated throughout the United States.

VOL. I.—NO. 1. BOSTON, OCTOBER 1, 1883.

Eastern Rubber Company,

Manufacturers, Importers and Dealers in

INDIA RUBBER GOODS

OF EVERY DESCRIPTION.

Rubber Belting,
Rubber Packing,
Rubber Tubing,
Rubber Valves,
Rubber Hose,
Rubber Springs,
Rubber Soling,
Rubber Gaskets,

RUBBER GOODS

OF ALL KINDS FOR MECHANICAL PURPOSES.

Rubber Clothing, Rubber Horse Covers,
Rubber Boots and Shoes,
Rubber Wagon Aprons,
Rubber Drill and Duck, Rubber Mats,
Rubber Sheeting,
Rubber Cloths,
Rubber Druggists' Sundries, etc., etc.

No. 29 Milk Street,

—AND—

2 & 4 Hawley Street,

BOSTON.

Write for Price-list and Discounts, naming article you wish quotations on.

ALFRED W. WORTHLEY.
S. DANIEL TOWNER.
A. RANDOLPH.

Vulcanized Rubber Fabrics

ADAPTED TO

MECHANICAL PURPOSES.

RUBBER BELTING and PACKING.

Vacuum Pump Valves,
Hall Valves,
Car Springs,
Wagon Springs,
Jo s Packing,
Rubber Bellows,
Sheet Rubber,
Piston Rod Packing,
Gaskets and Steam.

Hard Cushions,
Emery Wheels.

THE Sardine

MY DEAR, I SEE BY THE PAPER THIS MORNING THAT THE LATEST THING IN "CHOKERS" IS A "SARDINE TRUNK." THIS WILL MAKE CONSIDERABLE NOISE, DEAR THAT WILL. IT IS "ABOUT AS MUCH AS THEY ARE UP TO KEEP THESE FASHION MONGERS, WITH THEIR SILLY FRENCH FOLLIES.

THE PIONEER RUBBER TRADE JOURNALS.

A VIEW is presented on another page of an early issue of the first journal ever published in the interest of the India-rubber industry and trade. The writer has not yet been able to discover a complete set of this publication; indeed the few numbers of it in his possession are all embraced within a twelvemonth, and it may be that this the limit of its existence. The publication referred to was was *The Rubber Era*, further described at the head of its editorial page as "a weekly journal devoted exclusively to the vast and growing industry of rubber." Without having access to Vol. I, No. 1, and presuming the issue to have appeared without interruption from the beginning, the date of the birth of *The Rubber Era* may be set down as Saturday, September 26, 1880—some four years earlier than the establishment of our London contemporary, which, in turn, antedated the Dresden rubber journals. The responsible man was "Frank Cahill, proprietor," of whom the files of the paper reveal nothing more than is contained in a complimentary notice reprinted from a friendly exchange, referring to Cahill as "a veteran journalist, having done good service on the *Tribune* in Mr. Greeley's time." Some attempt has been made by the writer to learn more of the history of this pioneer rubber journalist, but he is now at least not active in any department of newspaper work. No trace of his enterprise lingers at Nos. 82–84 Nassau street (New York), where, after making headquarters at his printers' for a few weeks he opened an office on account of "the steady and healthy growth of *The Rubber Era*," and the consequent "increasing demand for greater accommodation." His name appears in the New York Directory only for the year in which the *Era* was published.

How Frank Cahill came to be the proprietor of a rubber-trade journal might form the basis of an interesting story, if one only knew it. Mr. Greeley, under whom he had "done good service," had now been dead for eight years, and the chances are that Cahill was no longer young. New ideas and methods were creeping into daily journalism and perhaps his former "good service" would no longer be considered as such. In other words, Mr. Cahill was probably "out of a job," and ready to turn to any possible new field of employment. Again, there were a few good trade journals published, and the success of David Williams's *Iron Age* (then twenty-five years old), for example, had turned the thoughts of many a plodder of the daily press at a small weekly salary to the possibility of amassing a fortune from a trade paper which he should own and which would edit itself. The feebler imitators of these few successful special journals were already numerous, but the field was too new to permit of proper discrimination between the good and the bad. Any way Mr. Cahill probably knew some rubber-man sufficiently to have learned, after a life time of ignorance on the subject, that "the vast and growing industry of rubber" was the biggest thing out; it had no representative journal; Mr. Cahill was a journalist without a fixed position; he would occupy the vacant field and make his fortune there before it was preëmpted by another.

At least one can imagine that such was the beginning of *The Rubber Era*. Certainly the advertising columns of the paper do not indicate that such a wide and urgent want had existed for the paper in the trade that the leaders were ready to come forward with patronage adequate for the support of an organ. As for the paper itself, comparison with the successful trade journals of to-day would be hardly fair. Credit must be given to its publisher for making the pioneer attempt in the field of rubber-journalism. There was no precedent by which to gage his work; even the qualifications needed by the trades-journalist remained to be defined. Nobody in the rubber trade in those days was writing on any of the numerous subjects embraced in it, and there was little in print for *The Rubber Era* to clip. So far as India-rubber was concerned, therefore, the attention which the new journal gave to it was comprised within a creditable weekly market report, an editorial article on some subject connected more or less intimately with the rubber trade, and the reprinting of the published life of Charles Goodyear and the patents of Thomas Hancock. The remaining columns were filled with selected humor, poetry, and useful information. In the seventeenth issue of the paper there was but one rubber manufacturing concern advertised, with some dealers in supplies, and a few rubber brokers. More than three of the eight pages of that number were filled with literary matter.

But the proprietor of *The Rubber Era* fixed a commendably high estimate upon his paper. The subscription price was $5 a year for an eight-page sheet of four columns to the page, or pages 11¼ × 16 inches in size. He had "sole agents" in London, Edinburgh, and Paris, and claimed to have subscribers in every country possessing a trade in crude or manufactured rubber. Instead of confining his attention to rubber-men alone, subscriptions were solicited from everybody needing rubber in their business, including the coal companies and dealers in windmills.

The second American journal in this field was *The Rubber Trade Reporter*, a semi-monthly, which first appeared in Boston, on October 1, 1883, under the business management of C. M. Canty, who appears also to have had control of the *Newsdealer and Stationer*. Contributions to the new journal were to be addressed to the "managing editor," but the name of this functionary does not appear. The publication office was at No. 186 Devonshire street, and the terms $2 per year in the United States and $2.50 abroad. There were sixteen three-column pages, 10½ × 13½ inches in size, and the distribution of space in the issue photographed on another page of THE INDIA RUBBER WORLD was as follows: Advertising (including hotels, etc.), 22 columns; articles on rubber and allied subjects, 12½ columns; jokes and other miscellany, 13½ columns; total, 48. The editor appears to have been rather facetious generally, and the hope is expressed that no offense

will be taken at the humor in the "Trade Paragraphs" This, by the way, was a feature of which *The Rubber Era* contained no trace. But in the Boston paper there were well-meant notices of the arrival of E. S. Converse from a pleasure tour in the West; Joseph Banigan from ditto in Europe, welcomed home with a "surprise banquet"; A. O. Bourn as a successful governor of Rhode Island; H. G. Tyer adding to his factory; C. M. Clapp as an active politician; J. S. Abecasis, the rubber broker, visiting Boston, and so on The price of fine Pará rubber was reported in one issue at $1.03, with a prospect of going higher when the manufacturers should become more active. The various African grades were quoted at from 41 to 65 cents. Prominent among the advertisers in *The Rubber Trade Reporter* were the Pará Rubber Shoe Co., Loewenthal & Morgenstern, and Jules S. Abecasis & Son, none of whom are now connected with the rubber trade, while some have joined the silent majority.

Of the third rubber journal on our list of those antedating THE INDIA RUBBER WORLD, there is little to be said. Its title, *The Pará*, was adapted from that of the Pará Rubber Shoe Co., whose brilliant but brief and unsuccessful career will long be remembered. It was issued from the Boston offices of the company and was really only an attractively gotten-up advertising sheet, with pictures and humor sandwiched between the descriptions of "Pará" goods.

IS THE TIRE BUSINESS A GOLD MINE?

THE season of 1896 has already merged into that of 1897; and the majority of the pneumatic tire manufacturers have balanced their books and know how much they have made —or lost. One thing has been clearly proven: the manufacture of pneumatic tires is not a gold mine. Or, to speak more exactly, it is very much like gold mining. One of the most noted statisticians of Europe once said that every ounce of gold extracted from Mother Earth had cost its full market value in labor alone. This proposition remains unchallenged; and there is a corollary to it, viz.: that if you count in the lambs who have been fleeced by gold mining sharks, every ounce so extracted has cost five times its market value. Now, in this statement there lies a moral for the tire trade. The manufacture of pneumatic tires is looked on as a gold mine, and everyone wants to have a hand in it. "Tires," say those who have not been in the business, "can be made for $3 a pair, and they sell readily for $6. What a bonanza! Let's go in for it!" But the manufacturers who have summered and wintered the production of pneumatic tires have learned a lesson. It is true that you can make a pair of 28-inch tires for $3—of old shoes; but if you once sell them for $6 *without* a guarantee, you may be sure that your customer will never come back; if you sell them *with* a guarantee, you may be sure that he will—with a scowling demand for replacement. Now, no tire fit for an adult to ride on can be made for $3. No manufacturer who works for the future can afford to make a tire that costs less than $4 a pair. Let us see. Here are the items:

Between three and four pounds of fine Pará rubber, from eighty to ninety cents a pound.

Washing, drying, and shrinkage of over one-quarter.

Grinding and mixing.

Calender work.

Preparing and weaving special cotton fabric.

Labor in building up tire.

Vulcanizing, testing and inspection.

Loss on "seconds."

Shop expenses; that is, interest, depreciation of plant, taxes, insurance, water-rates, gas, coal, oil, etc.

Salaries of superintendent, clerks, engineers, watchmen and non-producers.

Experimenting; a large item in these days where improvement is always sought.

Selling expenses; that is, salesmen, traveling expenses, advertising, office rent, clerkage, insurance on stock, freight, teaming, etc.

Interest on stock carried to fill orders promptly, and depreciation of stock.

Replacing tires actually defective or alleged to be so.

Bad debts; in 1896 a large item.

Add all this up and see how much your tires have cost you, not in estimates, but after you have made up your books and your bank account, and figure what *divisible* money is left.

To sum up the above: under the most favorable conditions, a large manufacturer can make to-day not over 20 per cent. profit on pneumatic tires, and unless a manufacturer makes from fifty thousand pairs upwards during the season, he cannot come out whole. Now, on a staple which does not change from season to season, like garden hose or cotton goods, a profit of 10 or 12 per cent., or even less, is by no means to be despised—on a large production; but for a patented article, which is subject to so heavy a guarantee, one liable to so many expenses, and one so treacherously provocative of misrepresentation as a pneumatic tire, a profit of 20 per cent. is quite too small. Abroad they have found this out, and tires which sell here for $6 wholesale sell there for $15, though they can be more cheaply made.

The concerns new in the business have not yet found all this out, but it remains true that no one, under present conditions, can net more than one dollar on pneumatic tires; scarcely any one did so well in 1896; and unless the manufacturer can market tires at $6 in enormous quantities, there is not that much profit. The small manufacturer cannot pay for his advertising out of his gain; and yet, strange to say, some new manufacturer stands constantly ready to embark in the business of selling tires for five dollars or less a pair.

Moral: live and learn.

A NEW USE FOR CEMENT.

THE ordinary bicycle repair man is an unsatisfactory individual at best, but one at Hinsdale, Mo., if the story be true, is the meanest of the lot. It seems that he objected to having customers wait until jobs were finished and he therefore spread a thick coat of rubber cement over a portion of his counter and waited for results. A bloomer girl came in and plumped herself upon the counter to rest. When she tried to leave however there was trouble, and she was obliged to remain there until copious applications of benzine effected a release.

A VERY practical and we believe new plan for making a good imitation for semi-hard rubber varnishes or dips is to have two solutions, one of balata in bi-sulphid of carbon, the other of celluloid in methylated spirit. A piece of metal dipped alternately in these solutions and dried after each dipping will have a very highly polished surface that will wear as well as hard rubber, that will not be affected by acids, alkalies, or oils and that can be made of any build desired.

SUCCESSFUL RUBBER SUPERINTENDENTS.

NO. I.—ERSKINE F. BICKFORD.

IT is with singular satisfaction that THE INDIA RUBBER WORLD introduces to its readers by means of this sketch the superintendent of the largest and best organized rubber company in the United States, if not in the world. Just how the photograph was secured to make the illustration it is probable that Mr. Bickford will never know. It is no violation of confidence, however, to state that the salient points of this article fell from the lips of E. S. Converse, whose appreciation of and regard for his modest superintendent was revealed in every sentence.

Mr. Erskine Frank Bickford was born in Woodstock, Conn., fifty six years ago. He received a common school education, after which he worked in various capacities until 1861, when he enlisted and served with credit for three years. At the end of this time he was captured and confined in the hospital prison at Richmond, Va. On his release from this durance he went to Annapolis to do clerical duty for the government. Later, his abilities being somewhat appreciated by a grateful country, he was made hospital steward.

ERSKINE F. BICKFORD.

In 1865 he entered the office of the Boston Rubber Shoe Co., then but a small corporation. Indeed it was so small that Mr. Bickford with the help of one assistant was able to run the office, handle the pay roll, receive the goods and do the billing. The superintendent at that time was John Robson, the father of John Robson, the present superintendent of "factory number two." About two years after the advent of the subject of this sketch the elder Robson died and was succeeded by Mr. J. B. Sweetland, who was superintendent for about four years, leaving in 1872. During this interval the business had grown considerably and the factory had been enlarged from time to time. On the retirement of Sweetland, Mr. Converse was for a short time his own superintendent, with Mr. Bickford as an able assistant. With the continued growth of the enterprise, however, the time of the former became more and more engrossed in the general management of the business, while upon the latter devolved the details of manufacture. That Mr. Bickford was and is marvellously adapted to do this kind of work is shown in the splendidly organized army of operatives who are employed in the great factories at Malden and Melrose. Personally, Mr. Bickford is quiet, studious, a great reader, and conservative to a degree that makes one marvel at his great success as an executive. His silent self-reliance and secretiveness are epitomized in the fact that since 1863 he has carried somewhere in his sturdy frame a bullet which no surgeon can locate.

In addition to his position as superintendent, Mr. Bickford is a director in the Boston Rubber Shoe Co., a trustee and director in the Malden City Hospital, a director in the Malden Savings Bank, and an active supporter of the Malden Baptist Church.

THE SO-CALLED TIRE TRUST.

DURING the entire season of 1896, there has been more or less talk about a pneumatic tire-trust, as was natural during an epidemic of what what might be called "trust-ail"; for a few weeks past the thermometer has shown a decided rise in temperature of the suffering public, and more conjectures have stalked abroad about a new and ill-understood phase of the disease. Especially the rumors of a sale by Morgan & Wright to an English syndicate disturbed the patient's rest; and now comes a further rumor to disquiet us that certain well-known capitalists in New York are seeking to combine all the tire-manufacturing interests.

The simple facts in the case appear to be that ever since a year ago, the wiser heads in the pneumatic tire trade have clearly seen that the industry was being sacrificed to unbusiness like competition, ignorant manufacture and excessive cutting of prices. The trade was threatened with the loss of all its profit, and what was worse, tires were depreciating in quality. An effort to arrest this downward course took shape early in 1896 in what is now so favorably know to the trade as the Rubber Tire Association. This is merely a social organization whose action has no binding force on any member, unless the matter appeals to his judgment; but it has created a great deal of good feeling in the trade and much honest and above-board coöperation. The natural sequence to such an organization is a further onward step in mutual business amity; and a number of manufacturers have expressed the feeling that the closer they can work together, the better it is for the trade. The effort to get trade by making a better tire is much more desirable than one to get it by lowering an already small enough price.

For this reason, and others equally valid, it would not be surprising if some of the representative men in the tire trade should still further approach each other in an effort to minimize the difficulties of unnecessary competition and to foster care and skill in the production of an article which should never be ill-made. If any individual is interested in this matter, it is the wheelman, who is the ultimate and most important factor in the problem; and any plan of coöperation which will result in bettering the tire will be welcomed by all. There is no danger that the price will be raised to the consumer, and every promise that closer ties will produce better pneumatic tires.

OFFICIAL STATISTICS OF INDIA-RUBBER AND GUTTA-PERCHA.

For the United States Fiscal Year Ended June 30, 1896.

[By courtesy of the Chief of the Bureau of Statistics of the Treasury Department]

INDIA-RUBBER.

I.—Imports of Crude India-Rubber, by Countries.

FROM—	Pounds.	Value.
Europe:		
Belgium	234,132	$ 131,994
France	246,425	137,700
Germany	1,069,087	417,906
Netherlands	407,475	142,022
Portugal	1,667,306	740,133
United Kingdom	7,539,367	3,607,825
America:		
Brazil	22,035,563	10,205,341
Colombia	525,199	189,807
Costa Rica	56,743	17,931
Ecuador	736,175	240,919
Guatemala	15,718	26,716
Guiana—British	550	240
Dutch	168,962	54,551
Honduras	136,934	57,497
Honduras—British	16,260	5,166
Mexico	124,543	41,432
Nicaragua	850,304	35,845
Peru	9,924	4,634
Salvador	16,861	5,030
Uruguay	3,800	1,928
Venezuela	141,627	72,644
West Indies—British	20,669	8,714
Asia:		
East Indies—British	621,542	118,508
Australasia	150	73
Africa:		
Liberia	1,561	524
Madagascar	14,377	6,296
Total	38,774,460	$16,603,020
Total, 1894-95	39,741,607	$18,353,121
Total, 1893-94	33,757,783	15,077,993
Total, 1892-93	41,547,680	17,809,239
Total, 1891-92	39,976,206	19,716,216
Total, 1890-91	33,712,089	17,856,280

II.—Imports of Crude India-Rubber, by Customs Districts.

AT—	Pounds.	Value.
New York	34,265,485	$15,610,870
Boston	1,966,491	773,480
New Orleans	502,969	206,027
San Francisco	30,240	13,558
Mobile	276	85
Total	39,741,607	$16,353,121

III.—Exports of Crude India-Rubber, by Countries.

TO—	Pounds.	Value.
France	124,320	$ 61,365
Germany	86,780	44,346
Netherlands	28,991	13,946
Russia	146,465	106,186
United Kingdom	709,525	390, 79
Canada	1,731,403	828,988
Japan	7,590	2,439
Total	2,891,072	$1,448,941
Total, 1894-95	1,384,048	$ 662,839
Total, 1893-94	2,344,856	1,142,007
Total, 1892-93	1,072,360	617,194
Total, 1891-92	1,600,824	867,371
Total, 1890-91	1,041,300	592,251

IV.—Imports of Manufactures of India-Rubber, by Countries.

FROM—	Value.
Austria-Hungary	$ 500
Belgium	9,978
France	83,883
Germany	101,724
Italy	30
Netherlands	81
Switzerland	5
United Kingdom	97,162
Dominion of Canada	407
Mexico	5
West Indies	32
China	169
Hongkong	44
Japan	136
Total	$294,228
Total, 1894-95	$315,902
Total, 1893-94	309,308
Total, 1892-93	338,435
Total, 1891-92	371,580
Total, 1890-91	354,645

V.—Imports of Manufactures of India-Rubber, by Customs Districts.

AT—	Value.
Baltimore	$ 1,150
Boston	20,612
New Haven	368
New York	231,531
Philadelphia	22,584
Portland, Me	692
New Orleans	340
San Francisco	4,738
Buffalo Creek, N. Y.	196
Chicago	6,530
Milwaukee	380
Minnesota, Minn	631
Vermont	133
Cincinnati	232
Denver	135
Indianapolis	650
St. Louis	3,022
All other ports	405
Total	$294,228

VI.—Exports of Manufactures of India-Rubber (and Gutta-Percha), by Countries.

TO—	Boots and Shoes.	Other Goods.
Europe:		
Austria-Hungary	$	$ 1,558
Belgium	6,868	54,384
Denmark	3,309	3,094
France	4,366	82,310
Germany	5,980	208,250
Italy	18	35,971
Netherlands	1,204	76,920
Portugal	330	153
Russia		7,482
Spain		444
Sweden and Norway		2,098
Switzerland		711
Turkey	2,875	570
United Kingdom	123,602	508,415
America:		
Nova Scotia, New Brunswick	14,290	15,609
Quebec and Ontario	3,243	261,433
British Columbia	11,995	9,571
Newfoundland and Labrador	2,749	2,882
Miquelon and Langley	2,474	50
Mexico	597	93,180
Costa Rica	32	3,865
Guatemala	1,403	18,006
Honduras		1,747
Nicaragua	20	2,266
Salvador	114	6,296
Bermuda	$ 102	$ 873
British Honduras	103	244
West Indies—British	309	8,590
Danish	61	480
Dutch	28	360
French		89
Spanish	1,733	29,669
Haitti	740	979
San Domingo	83	1,900
Argentina		3,212
Brazil	1,185	22,087
Chile		6,839
Colombia	1,291	12,842
Ecuador	211	4,336
Guiana—British		2,182
Dutch	14	149
Peru	24	4,250
Uruguay		706
Venezuela	520	6,871
Asia:		
China	254	1,515
East Indies—British	43	2,289
Dutch		84
Hongkong	3,992	1,457
Japan	9 257	28,576
Russia		199
Oceanica:		
British Australasia	6,799	35,711
French Oceanica	29	250
Hawaii	4,687	19,093
Phillipine Islands		333
Africa:		
British Colonies	797	28,314
Canary Islands		103
Portuguese Colonies		597
All other Africa	12	25
Total	$216,057	$1,642,499
Total, 1894-95	$225,986	$1,279,156
Total, 1893-94	155,011	1,306,831
Total, 1892-93	252,391	1,357,015
Total, 1891-92	185,570	1,232,497
Total, 1890-91	141,679	1,094,764

NOTE.—The exports of rubber boots and shoes embraced 350,713 pairs, as against 383,793 pairs during the preceding twelve months and 261,657 pairs in 1893-94.

VII.—Exports of Manufactures of India-Rubber (and Gutta-Percha), by Customs Districts.

FROM—	Boots and Shoes.	Other Goods.
New York	$ 72,635	$1,045,094
Boston	109,594	180 630
Philadelphia		44,615
Vermont ports	1,195	136,199
Detroit		44,577
San Francisco	13,082	57,617
Champlain, N. Y.	1,427	26,963
Bangor, Me	5,184	6,888
Puget Sound	11,310	6,544
All other ports	1,630	93,372
Total	$216,057	$1,642,499

VIII.—Exports of Foreign Manufactures of India Rubber and Gutta-Percha, by Countries.

TO—	Value.
India-Rubber:	
Belgium	$ 80
Germany	50
United Kingdom	1,703
Canada	4,583
Mexico	10
Gutta-Percha:	
Germany	2,439
Mexico	118
Total	$8,426

GUTTA-PERCHA.

I.—Exports of Crude Gutta-Percha, by Countries.

To—	Pounds.	Value.
United Kingdom		
Dominion of Canada		
Total	None	None
Total, 1894-95	504,752	$116,254
Total, 1893-94	8,609	2,223
Total, 1892-93	18,716	4,243
Total, 1891-92	8,567	5,170
Total, 1890-91	51,960	15,110

II.—Imports of Crude Gutta-Percha, by Countries.

From—	Pounds.	Value.
Germany	268,788	$66,977
United Kingdom	75,228	12,899
Honduras	2,900	432
Venezuela	231	38
East Indies—British	3,498,737	98,167
Total	3,843,854	$178,513
Total, 1894-95	1,326,794	$122,261
Total, 1893-94	498,763	84,340
Total, 1892-93	582,278	155,428
Total, 1891-92	308,239	114,874
Total, 1890-91	960,835	164,524

III.—Imports of Manufactures of Gutta-Percha, by Countries.

From—	Value.
Austria-Hungary	$ 30
France	1,783
Germany	67,603
Spain	12
United Kingdom	15,784
Dominion of Canada	15
Other countries	4
Total	$85,231
Total, 1894-95	$71,199
Total, 1893-94	30,654
Total, 1892-93	81,173
Total, 1891-92	61,276

PRICES AND IMPORTS OF RUBBER SCRAP.

RUBBER scrap advanced from 4⅛@4¼ for carload lots, about the 1st of last November, until toward the end of the year, when the ruling quotation was 5 cents, and there were predictions that 6 cents would be reached, as happened two years previously. After the latter date holders who had asked 5¼ cents showed a willingness to accept 5, while buyers freely offered 4¾. It is believed, in some quarters, that the market has been maintained by one or two buyers. In any event the future of prices will depend upon the needs of consumers. The season has so far advanced in the boot and shoe industry that heavy buying from that source can hardly be expected before the opening of spring, when new collections will be coming forward. Nor are the mechanical goods factories so active as to give promise of a heavy demand for rubber scrap. This, however, is a period between seasons, and by the middle of the month the market may wear a complexion now wholly unlooked for.

* * *

THE United States government reports the following imports of rubber scrap, in pounds, for twelve months ending June 30 in 1894, 1895, and 1896, respectively:

From—	1894.	1895.	1896.
Belgium		3,916	12,229
Denmark		52,053	46,622
France	68,211	52,045	42,868
Germany	707,647	742,259	1,910,033
Portugal		13,637	
Russia		131,361	398,321
Sweden and Norway	10,675	15,540	
Turkey	131,621	67,405	51,437
United Kingdom	188,997	254,489	340,439
Canada	664,498	583,871	659,830
Cuba	2,359	3,721	
British West Indies		112,266	
Mexico			3,140
British East Indies			409,752
Total	1,774,008	2,032,563	3,874,677

The average export value of the receipts for 1893-94 was 3.14 cents per pound; for 1894-95 about 3.10 cents; and for 1895-96 about 3.17 cents. The importations were entered principally at New York, with Boston in second place. The value of the importations in the last fiscal year was $123,068.

AN interesting collection or India-rubber producing plants, grown in the gardens of the Royal Botanic Society, London, was brought before a recent meeting of its fellows at Regent's park, by Mr. Sowerby, the secretary. There were over a dozen varieties.

PROGRESS OF THE HOOD RUBBER CO.

THE Hood Rubber Co. certainly have every reason to congratulate themselves on the quickness and thoroughness with which their plant at East Watertown, Mass., was put up, the machinery set in place, and the hands gotten at work. It was definitely decided on July 27, 1896, to go ahead with the scheme. On that same day ground was broken for the side track. The brick for the foundations came in over that side track and was laid the fourth of August. Everything was in readiness to start up on November third, the day that Mr. McKinley was elected. One week, however, was taken for a general cleaning up process and putting things to rights. On November tenth the engine was started and on the thirteenth the first dozen pair of shoes were made. From that time work was pushed and the output steadily increased until at the present time the factory is turning out about 2500 pairs of shoes a day and more hands are being put on just as fast as they can be placed. The capacity of the plant is easily 7500 pairs at the present time, and with the building arranged as it is, with four wooden ends and one solid brick end for extensions, it can be expanded very easily into a much larger plant. The working force of the Hood Rubber Co. is Mr. F. C. Hood, Treas., Mr. A. N. Hood, Sec., Mr. E. I. Aldrich, Selling Agent, Mr. H. C. Mason, Supt.

HONORING MRS. E. S. CONVERSE.

A MARBLE bust of Mrs. Mary D. Converse, paid for by popular subscription, was unveiled at Malden, Mass., on December 17, and presented to the public library in that town, where it will occupy a place in the art-room, as a companion to the bust of her husband, the Hon. E. S. Converse. It has been highly commended as a work of art and is from the studio of S. J. Kitson, of Boston. The number of subscribers exceeded a thousand, and the cost of the bust was $1200. Through the generosity of Mr. and Mrs. Converse the people of Malden enjoy the privileges of a public library, a hospital, a nurses' home, a day nursery, a church, and a beautiful park. It was in recognition of this generosity that the ladies of the town organized some time ago to pay this tribute to Mrs. Converse. The presentation address was made by the Rev. H. O. Hiscox, pastor of the First Baptist church, and the speech of acceptance by Deloraine Corey, chairman of the board of trustees of the library.

QUITE a business has grown up in some of the factories where notions are made in the manufacture of dress-linings. These goods are coated with rubber on one side, double-textured, and cut up in the proper widths for this use.

CORPORATE NAMES AND TRADE NAMES.

A MISAPPREHENSION that appears to have existed in many minds regarding the rights of corporations or others in the use of trade names may be corrected by a review of the rulings in the case of the B. F. Goodrich Co. vs. the Akron India Rubber Co. As is well known the world over the former company have for years been doing a large business under the trade names, the Akron Rubber Works and the Akron Rubber Company. When therefore a new concern was started in their city under the name of the Akron India Rubber Co., they at once appealed for protection from the courts, their leading claim being that confusion arose from the similarity between the names and that its tendency was to detract from their trade. Notice was immediately served by counsel for the new company on intention to appeal to a higher court, which was done. In the circuit court of Summit County, Ohio, at the September term, the cause was heard before Judges Caldwell, Hale and Marvin, and a decision in favor of the B. F. Goodrich Co. was delivered by Judge Caldwell. This decision is of especial interest and value to the rubber trade. While it is not practical to print the rulings in full a word or two as to the conclusions are in order.

In the first place the court held that the name of the new concern was so similar to the trade names owned by the plaintiff that it would certainly tend to confusion in the popular mind. That this confusion need not be actually experienced but could be judged by the court from the similarity of sounds. Further it was held that this confusion was proved.

In the second place the court held that any individual, partnership or corporation, may take a trade name entirely different from its corporate name and be protected in its use.

In the third place the court noted without mincing matters at all that it was the intent of the defendant in this case to simulate the name of the plaintiff; that he could have had no other purpose under the facts as testified to in this case but to get so near to the plaintiff as to derive some benefit from it. That it is not necessary to show that any one was actually misled by the similitude in names. The courts have, time and time again, by simply looking at names, determined whether a deceptive similitude existed that was likely to mislead, and if so, they have restrained without any evidence of confusion having arisen.

The defendant company, therefore, was given fifty days in which to choose another name than "The Akron India-Rubber Co." The name chosen since that time is the India Rubber Company.

AMERICAN WHEELS AND TIRES ABROAD.

NO less than sixteen makers of American bicycles are mentioned in the notices which have arrived of the twentieth annual Stanley show, in London. The Western Wheel Works (Chicago) exhibited 24 wheels; the Pope Manufacturing Co., 19; the Peoria Rubber and Manufacturing Co. (Peoria, Ill.), 12; and so on. Each of the companies referred to, as a rule, occupied a stand of the regulation size, though some were exhibited under the names of British agents or representatives. Other American bicycles represented were the "Dayton," "Fowler," "Stearns," "Syracuse," "Waltham," "Eclipse," "America," "Warwick," "Fay," "Ben Hur," "Envoy," etc. The American wheels generally were commended by the cycling press in reporting the show. One expression worthy of note was that a certain line of wheels was "equipped to suit the requirements of the English markets, including detachable tires." In the same exhibit, however, were wheels equipped with Morgan & Wright tires, and the majority of the American wheels shown probably had American-made tires, including the single-tube tire, as well as the "M. & W." type. The latter firm made a special exhibit, and L. C. Chase & Co. (Boston) and the Consolidated Rubber Works (Boston) were also represented. The Palmer Tyre Co., Limited (Birmingham, England), which had an extensive exhibit, may be regarded as an American enterprise transplanted to the other side. One journal remarked: "The Silvertown India Rubber and Gutta Percha Co., Limited, show a new tire made under the Palmer license. It is not unlike the Palmer as regards fabric, but it has the Dunlop form of attachment. We consider this tire a very good article." No matter how well an article of American manufacture may be suited to American needs, it doubtless is the part of wisdom to modify it for the requirements of any other country where a market for it is sought.

The exhibition referred to was followed immediately by the fifth National Cycle Show, at Crystal Palace, where American bicycles again occupied a prominent place. The Gormully & Jeffery bicycles, furnished with tires of the same make, were the recipients of much attention. Among the other bicycles shown were the "Cleveland"—made by the Lozier Manufacturing Co.,—the "Spalding," the "Monarch," and the wheels made by Adams & Westlake (Chicago) and the Miami Cycle and Manufacturing Co. (Middletown, Ohio).

Attractive advertising material was distributed liberally by American exhibitors at both shows, and it is safe to say that no visitor interested in bicycles or tires went away with the impression that the Americans have become an important factor in these industries.

WEB MANUFACTURE AT NEWPORT.

THE Narragansett Web Co. has been organized at Newport, R. I., to succeed the E. Read Goodridge Manufacturing Co., whose factory was closed on May 19 last, under an attachment in favor of Daniel Le Roy Dresser, a commission merchant in New York who had made large advances to the company. Mr. Dresser has secured, in Newport and elsewhere subscriptions to the capital of a new concern, and application has been made to the State for a charter, the capital being fixed at $90,000. There is also to be included the business of the Thurlow-Burnham Co., of Newport, engaged for three years past in making suspender webbing. G. M. Thurlow, of the latter firm, will be the manager of the Narragansett company, and his former partner, Daniel B. Burnham, will also be interested. Mr. Dresser, who bought the Goodridge factory at sheriff's sale in July, will retain an interest, besides handling the product of the mill. The other plant named will be given up, and the work consolidated in the Goodridge plant, which is known also as the Perry mill, from the name of a cotton manufacturer who once occupied it. The Goodridge company dated from 1886, and manufactured garter braid and webbing. All the lines mentioned will be turned out by the new company, which began work on January 2. Mr. Dresser has orders in hand for the full capacity of the mill, and it is expected that employment will be given to 200 hands.

RUBBER bands colored red and black in stripes are made in Germany. This is done by sticking sheets of red and black rubber together alternately until a sufficient thickness is formed and then cutting the masses in slices. A slice is wrapped around a form and the flat tube is vulcanized and cut into bands. This same band is also a specialty of the Fabers in this country and is without doubt an American invention.

HEARD AND SEEN IN THE TRADE.

ON every hand I hear questions about the probable effect upon the rubber-shoe trade of the new competing concerns started by deserters, so to speak, from the United States Rubber Co. The principal interest attaches to the movements of Mr. Banigan, who is beginning on a larger basis than the others, after having been a more important factor in the past. Turning questioner myself the other day, I found a member of the trade who freely expressed his opinions in this style:

"The best thing that ever happened to the rubber-shoe trade was the fixing of stable prices, as a result of the big combination in 1892, and the acquiescence of 'Deacon' Converse. Knowing from one end of the year to the other just what prices are to be—and from year to year, for that matter—and that there is to be no reckless cutting, all hands are better off, from manufacturer to customer. If I were starting a rubber-shoe factory to-day I should rather see the present prices maintained than a period of cutting and slashing.

"But Banigan isn't that sort of man; he likes a fight. And I shouldn't be surprised to see the liveliest competition during the next year or two that the trade has ever experienced. Of course he can't figure in the trade this season. The new factory hasn't really begun work yet, and the manufacturing season is practically over now for the old factories. He probably is figuring on getting orders for next fall's trade.

"The factories now in operation have a larger capacity than is needed for the whole consumption. Some of them were closed for months during 1896. Not only this, but the brands of boots and shoes made by them have an established reputation, and the goods are distributed by the cream of the trade—selling-agents, jobbers, and retailers. The leaders in the shoe trade everywhere are handling the goods already in the market and already in demand. Now a new factory, bringing out a new brand, must have new selling arrangements. If the best stores in any town are selling the established brands, the new-comers must be content with second-rate houses, or establish stores of their own—which is a most expensive plan.

"The established dealers can be made interested in a new line, of course, by the offer of very liberal inducements, and this probably is what the Banigan company have in view. But the first move of the dealers to whom these inducements are offered will be to report to the old companies, who will have a chance to do as well or better, if they like, and here is where Mr. Banigan will have a chance to measure his strength with the United States Rubber Co. He has a long purse, and can stand a long fight, but it does not seem to an outsider like me that he can win single-handed against such odds.

"It might happen, in case Mr. Banigan showed a disposition to fight, that the United States Rubber Co. would meet his cut in prices with still lower figures for the product of one of their factories—say the Woonsocket mill, which Mr. Banigan built up—and thus leave him helpless. The Banigan factory could not be run a great while at a loss, while one of the factories in the combination might almost throw away goods for awhile, the loss being made up from the other factories.

"As a matter of fact, I don't see how rubber shoes of good grade, and with crude rubber still so high, can be sold at a profit for less money than is now charged for them. More than that, I don't see how any new concern, large or small, can come into the field now and—without losing money—undersell the United States Rubber Co., after all their study of economy. All their immense output requires scarcely more outlay for certain expenses of administration than would the new Banigan company, with a single factory from which to derive an income.

"Of course no one is authorized to speak for Mr. Banigan in this matter, but he has never been known to avoid a fight. On the other hand, the policy of the United States Rubber Co. has been that of strengthening itself in every particular—creating a surplus fund, reducing expenses, consolidating factories, and closing the less profitable ones, evidently with the idea that it is part of wisdom to be prepared for vigorous opposition."

* * *

I HAVE been talking with the head of a new rubber company—not in shoes—which is starting out with comparatively little capital, with a view to competing on equal terms with the oldest and wealthiest concerns in the trade. "We mean to succeed," he said, "by means of the advantage we have in respect to new, high-grade machinery, and particularly to the compact and economical disposition of the machinery. One of the factories in our line is spread over so much more space than is necessary as to render economical working impossible, besides which the machinery is old and worn and valued in the column of assets at an absurdly high figure. Combined with good plant and good arrangement, we begin with an experienced superintendent and an outlet for just the quantity of goods that we can produce. Under such conditions, we fail to see what advantage anybody can have over us merely through having a bigger plant or more capital."

* * *

"THERE is a puzzling problem which is liable to come to any manufacturer at any time," said the manager of a large company. "It is the question of whether to shut down to tide over a dull time, or keep running. It costs something to keep a factory idle—whether it be money spent in giving the plant proper care or money lost in deterioration if the plant should be left entirely alone. This is apart from the ill results from having the employés idle for an indefinite time. In these days of close competition, when it is essential that goods be produced at the lowest possible cost, every operative must produce a maximum quantity of goods if the manufacturer is to be saved from loss. Well, too long a resting-spell, followed by the certain dropping out of place of some of the working force, prevents that harmonious working together of the hands, when the factory is reopened, necessary to the maximum of production. I don't wonder, then, that factories are often run at a loss, making goods for which there is no demand, or which cannot be sold except at prices below cost, rather than invite the ill results from shutting down. Of course, when the unprofitable running once begins, each day makes the owner poorer, and the question of when to stop is then even more perplexing than the first question of whether or not to start running at a loss."

* * *

I HEAR that the sale of rubber boots and shoes has been exceptionally good during the past month, thanks to the two heavy snowstorms which have visited New York and a considerable part of the country beside. Strange to say, New England has had little snow, while there has been enough in North Carolina to have a marked influence on the trade. Not only was last winter a failure as a rubber-selling season, but the winter of 1893-94 was not a particularly good one, so that the

entire rubber trade, should there be a succession of snows this year, will regard it as only a fair dispensation of Providence. Large stocks have gone into the hands of retailers, and if the conditions in New York be any criterion, the buying on the part of the public must have been very heavy already. The recent declaration of dividends by the United States Rubber Co. may be accepted as evidence of good condition of the trade.

THE MAN ABOUT TOWN.

AN AMERICAN TIRE MAN IN EUROPE.

THE advent of the Chase Tough Tread tire in England was synchronous with that of Mr. F. B. Hopewell whose likeness is here presented. Mr. Hopewell is the son of John Hopewell the treasurer of the L. C. Chase Co., Boston, and the fact that he had three years' training under his energetic and successful sire is a guarantee of his business fitness. This foreign missionary for the Chase tire is preaching the "tough tread" gospel very successfully, and is securing converts and contracts at a most satisfactory rate. He planned and installed a fine display at the Stanley Cycle Show, that attracted a deal of favorable attention, and led so dignified and conservative a paper as London *Engineering* to explain the virtues of the Chase tire and to frankly own its merits. Mr. Hopewell makes his headquarters in London, and as he is a fine linguist, and is familiar with Europe is evidently the ideal agent, even for so progressive a house as that of L. C. Chase & Co.

F. B. HOPEWELL.

THE LA FAVORITE RUBBER MFG. CO.

A NEW mechanical rubber company which has been incorporated in Paterson, N. J., bears the name that stands at the head of this article. The company advertise themselves as manufacturers of railroad and mill supplies, and as exclusive manufacturers of the Invulnerable Steam Packing. They are also taking orders for steam hose, valves, gaskets and a general line of mechanical rubber goods. The offices of the company are in the Romaine Bldg., Paterson, N. J., the factories being at Hawthorne, N. J. The officers are E. L. Perry, President and Superintendent, Fred. Mitchell, Sales Agent and C. E. I. Masten, Secretary and Treasurer. After February first, 1897, the company inform THE INDIA RUBBER WORLD that they will be in a position to fill all orders promptly, the products being of the best possible workmanship and prices as low as is consistent with quality.

IT is estimated that 20,000 rubber-gatherers are carried upriver from Pará at the beginning of each crop season, and brought back after it is gathered.

DEATH OF DR. HENRY TRIMEN.

IT is with regret that the death of this eminent botanist must be announced. It occurred in Ceylon on October 16. Henry Trimen was born in 1843, and graduated from the University of London in 1865. In 1879 he was appointed director of the royal botanic gardens, at Peradeniya, Ceylon. Here he immediately followed up the work of his distinguished predecessor, Dr. G. H. K. Thwaites, in the acclimatization and cultivation of India-rubber trees. He gave particular attention to the three American species introduced into India through the agency of Mr. Clements R. Markham, viz., the Ceará rubber (*Manihot Glaziovii*), the Pará rubber (*Hevea Brasiliensis*), and the Central American rubber (*Castilloa elastica*).

Dr. Trimen has for many years encouraged the planting of vast tracts of government land, under forest inspectors, being a believer in the profitable cultivation of the India-rubber tree when carried out on a wide scale. Seeds and cuttings grown in Ceylon have again and again been distributed to Calcutta, Madras, Burma, India, Jamaica, Singapore, Perak, Mauritius, and British Guiana. He has made from time to time many interesting reports on the cultivation of India-rubber trees.

Dr. Trimen was the editor of the *Journal of Botany* from 1872 to 1879; the joint-author of the "Flora of Middlesex"; author of the botanical portion of "Medicinal Plants," a work in four volumes published in 1875-80; author of a "Systematic Catalogue of the plants of Ceylon" (1885); and of a "Handbook to the Flora of Ceylon," his greatest work, published in 1893. He was the means of introducing into cultivation in Ceylon many valuable products of other countries. On July 1 last, owing to considerations of health, he resigned his appointment as director at Peradeniya.

JOSEPH THOS. WICKS.

* * *

OCTAVIUS N. COBURN, one of the oldest rubber-shoe makers in Malden, Mass., ded at his home in that town on December 20, from kidney trouble. He was 72 years of age, and leaves one son. He patented an improvement on rubber shoes, which he gave the Boston Rubber Shoe Co., the value of which was so great to the company that he was allowed to retire on pay some five years ago.

* * *

THE Day Rubber Co. (St. Louis, Mo.) announce the death of William A. McCollin, which occurred at his home in that city on December 30, in a card which adds: "Mr. McCollin has represented our house for the past fourteen years, faithfully, efficiently, and honorably, and it is with sincere regret that we have to make this announcement."

THE FIRST OF THE SEASON.

GARDEN HOSE is so universally used that anything new excites an active interest, and anything better meets a warm reception. The New York Belting & Packing Co.'s line for 1897 is finer in quality and wider in range than anything the company has ever offered. All the old brands—1846 Pará, Double Diamond, Carbon, Spider—are there, and every one enhanced in value. There are also a number of new grades, each with some special point of usefulness. Three of them—Nonpareil, Puritan, Comet—are prepared expressly to stand unusually heavy water pressures. The fourth—Oxford—is a colored hose, brightening the line and attracting buyers. In connection with its hose the company has issued a neat and effective booklet, giving a full description of each brand, and enabling buyers to judge intelligently of its value.

THE CANDEE CALENDAR.

THE Candee Co. has been famous for some years for the exceedingly handsome and artistic calendars that it puts out. Everybody will remember its last year's calendar,—a very beautiful little piece of life and color—children loading up a Candee Croquet with kittens, and giving them a sail on a pond.

The new '97 Candee calendar is just out, and it is certainly the handsomest yet. It is the same size as last year, 11 × 13 inches, printed in ten or a dozen colors, and it shows a very lively scene. The good lady of the house evidently started to put on her Candee Rubbers, but while she is putting on one, the little Skye terrier puts off with the other rubber, and the little three-year-old grabs up her mother's umbrella and starts after the dog. It is a very spirited scene. It's an artistic piece of work too, the original being painted by one of the finest painters in the country. Plenty of people have paid 25 or 50 cents for a less artistic calendar, and this one you can get for nothing by sending your name to L. Candee & Co., New Haven, Conn.

You see just what this calendar looks like by looking at the fine half-tone reproduction of it on another page.

NICARAGUA RUBBER AGAIN.

SINCE the publication, last month, of an article on the cultivation of rubber in Nicaragua, THE INDIA RUBBER WORLD has received a call from Mr. J. N. Garrison, of Bluefields, Nicaragua, who is forming a plantation. Two years ago he planted 4000 rubber trees, to which he is about to add 16,000 more. He reports not a little interest in the subject in Nicaragua, several plantations having been started. H. Willdesen, of Bluefields, has a plantation of 20,000 trees, for the most part eight years old, and considered large enough for tapping this year. The International Planting Co. have 6000 trees two years old. Brown & Harris, who long have been in business at Bluefields, running a line of steamers to the United States, purpose planting 50,000 rubber trees. Another concern mentioned as interested in rubber culture is the Rama Tropical Fruit Co., at Rama, Nicaragua. The state pays a subsidy for each tree planted of 10 cents Nicaragua money (=.049 United States money).

The Nicaraguan government has amended the decree of July 13, last, prohibiting the exportation of rubber from Nicaragua after January 1, 1897, so as to permit such exportation until January 1, 1898. All rubber exported next year, however, will be subject to an export tax of 10 cents Nicaraguan money per libra, which would be equivalent to 4¾ cents per pound in United States money.

The exports of India-rubber from the two principal ports of Nicaragua to the United States are shown to be as follows in the United States consular reports, for fiscal years ending June 30:

YEAR.	SAN JUAN.		BLUEFIELDS.	
	Pounds.	Value.	Pounds.	Value.
1891-92	.....	$115,261 00	606,955	$258,739.94
1892-93	.....	96,532 93	408,054	179,629 10
1893-94	.....	110,810.09	425,777	156,269.59
1894-95	288,050	133,862 68	573,842	259,220.67
1895-96	132,573	62,118 35	525,921	252,698.58
Total		$518,585.05	2,540.549	$1,106,557.88

The figures given for values in the table relate to United States currency.

A CHANGE IN THE PALMER POLICY.

THE Palmer Pneumatic Tire Company announce a change of policy which will be of more than ordinary interest to the trade. For several years Palmer tires have been exclusively sold through the Columbia Rubber Works Company, New York, but as the plan has had some disadvantages they will hereafter be sold by the Palmer Tire Company only. The Palmer Company have long maintained an office and a free repair department in New York city. Additional room has been secured at the present location, 66 Reade street, and extensive improvements and alterations are now in process to meet the new requirements. The Eastern trade will be supplied from New York as heretofore, while the Western trade will be looked after by the Chicago house.

No changes are contemplated in the executive staff of the Palmer Tire Company, but a number of additions have been made to their traveling and clerical forces. The line of Palmer Tires will be the same as last year, with the addition of one or two new styles. A tire specially adapted for tandem use will also be manufactured. It will be constructed with the aim to give the greatest possible speed and resiliency in conjunction with strength, and will contain the self-healing feature which is found in the regular Palmer Tires. To secure greater efficiency slight alterations will be made in one or two of the present styles, but no change in the principle of construction is contemplated. Palmer Tires have always been the highest priced tires on the market, due to their orignal construction, but as to whether there will be any change in 1897 prices, our reporter was unable to learn.

MR. PUSINELLI GOES TO LONDON.

THE first of the year brought no change in the firm names of Heilbut, Symons & Co., of London and Liverpool; Reimers & Meyer, of New York and Boston; and Pusinelli, Prüsse & Co., of Pará and Manáos, the expiring partnership agreements being renewed on that date. But Mr. Fritz Pusinelli leaves Pará to take a place in the London office, there being otherwise no change in the *personnel* of any of the offices. The business represented by these firms was established in London in 1839, since which time it has grown to important proportions in the rubber trade. The succession of firm names in the Pará branch-house has been C. Jaeggi & Co., E. Schramm & Co., and, in 1887, Pusinelli, Prüsse & Co. The principals are Fritz Pusinelli and Otto Prüsse, both formerly in the employ of the Messrs. Schramm and, like almost every one else connected in an important way with any of these affiliated houses, graduated from the parent house in London. It is understood that one incentive to Mr. Pusinelli's change of residence is his desire to have his children educated in Europe. He does not consider that he has left Pará permanently. It may be mentioned that Mr. Prüsse is spending a year in Europe, being now at Wiesbaden.

IT is said that the North British Rubber Co. are now bringing out golf balls of pure white Gutta-percha. This will undoubtedly be an advantage as in use the ordinary golf ball becomes very much soiled and needs repainting quite often,

* * *

TIRES continue to monopolize the attention of inventors in the India-rubber line in Great Britain even to a greater extent than in the United States. Thus during the past three months, out of a total of 366 applications for patents relating to India-rubber, no less than 321 had reference to tires.

TRADE AND PERSONAL NOTES.

A SEMI-ANNUAL dividend of 4 per cent. has been declared on the preferred stock of the United States Rubber Co., payable January 15, to stockholders of record at the closing of the transfer books at the close of business on December 24. The books will be reopened at the opening of business on January 16. A dividend of 2 per cent. has been declared on the general or common stock of the company, payable February 15. The distribution by these payments will aggregate $1,179,340, being $776,020 to the holders of preferred stock and $403,320 to holders of the common. The only other dividend ever paid on the common stock was on March 15, 1895, when 2½ per cent. was distributed.

=Coupons were advertised to be payable on and after January 1 on the 6 per-cent. mortgage debenture bonds of the New York Belting and Packing Co., Limited, and on the first-mortgage gold bonds of the Mechanical Rubber Co., at the office of the Knickerbocker Trust Co., No. 66 Broadway.

=Treasurer William T. Rodenbach, of the Goodyear's Metallic Rubber Shoe Co. (Naugatuck, Conn.), announced recently that unless a reduction of the local taxation could be secured, a new location would be chosen for the company's factories. The annual tax now paid to the borough is $23,000, which Mr. Rodenbach considers twice too much. It is understood that overtures have been received from several towns, which are willing to grant liberal concessions in order to secure the factories. The board of trade of Springfield, Mass., has taken an interest in the matter. The company has 1500 employés and gives support to half the population of the borough.

=H. A. Sanders and W. C. Metcalfe, doing business as the Sanders-Metcalfe Duck and Rubber Co., at No. 527 Church street, Nashville, Tenn., have made an assignment to Hamilton Parks of all accounts and fixtures, together with the entire stock of goods in the storehouse, except certain articles consigned to the firm by the United States Rubber Co. and the Sanders Duck and Rubber Co. (St. Louis). The assignee is instructed to sell the stock as soon as possible, to pay what is due to the Sanders Duck and Rubber Co., and then to pay in full or *pro rata* all other claims. The liabilities aggregate $17,093.22, including: United States Rubber Co., $4797.01; Sanders Duck and Rubber Co., $3669.15; Standard Rubber Corporation, $2728; and American Rubber Co., $1610.75.

=The Hood Rubber Co. (Watertown, Mass.) announce as their Philadelphia agents Paul Brothers, of No. 711 Market street, long and successfully established in the shoe trade. Selling-Agent Aldrich has been visiting Chicago and St. Louis. There are 300 hands at work in the company's factory.

=The Goodyear Rubber Co. have removed their office at Middletown, Conn., into the new building recently added to their factory plant.

=The Jenkins Rubber Co. (Holyoke, Mass.) have been considering propositions from other towns to remove their factory. They have had a prosperous business, succeeding the old Tuttle Rubber Co., and now employ about eighty hands. The present quarters are becoming cramped.

=The Marron Manufacturing Co., rubber-cloth manufacturers at Stoughton, Mass., are building an addition to their factory, 65×35 feet and two stories high, and putting in a 90 horse-power boiler.

=The Hudson Rubber Co. (Hudson, Mass.) have been incorporated under the laws of Maine, to manufacture ladies, and children's garments, with $25,000 capital. Frank E. Brown is named as president and Fred F. Trull treasurer.

=President Seiberling, of the Peoria Rubber and Manufacturing Co. (Peoria, Ill.), says that they expect to make this season 40,000 bicycles and 100,000 or more tires.

=The last of the manufactured goods on hand in the factoy of the Marvel Rubber Co. (Woonsocket, R. I.) were shipped on December 14 to Boston, and the factory closed for good.

=The Elastic Tread Horse Shoe Manufacturing Co. have been incorporated under the laws of New York, with $25,000 capital. The directors are Julius Louis, Jeannette Hilgers, and Benedict S. Wise.

=The New York Belting and Packing Co., Limited, are sending out to dealers a handsome little box containing samples of ten grades of their garden-hose, which can hardly fail to make a favorable impression in the trade. The samples are sections of hose, full diameter and two inches long, placed in a box arranged in ten compartments, of which there are two rows, the whole so designed as to fold together into dimensions not exceeding 2½ × 2½ inches and 6 inches long. It is a conveniently-handled case, whether open or closed, and especially convenient for showing and taking care of the goods. The outer material of the box is dark-green muslin of a quality that would serve well for a handsome book-binding.

=The valuable article in this issue on the manufacture of insulated wires by Frederick A. C. Perrine, D. Sc., is a part of his forthcoming book on "Conductors and Their Use." The author is especially fitted to deal with such a subject, and THE INDIA RUBBER WORLD will soon present to its readers an exhaustive review of the volume.

=Henry Werner & Co., the well known rubber-shoe jobbers of Detroit, Mich., have removed from that city and located in Pittsburg, Pa. Their address is 1616 Penn venue.

=P. Carter & Bell and Curtis P. Smith have resumed business under the name, P. Carter, Bell & Co. in New York city. They are prepared to supply the trade with all kinds of rubber substitutes, and chloride of sulphur, while Mr. Bell still follows his specialty as consulting chemist for rubber manufacturers.

=The *Stevens Life*, the bright and practical periodical of the Stevens Institute of Technology, Hoboken, N. J., has for a leading article in its Christmas number an exhaustive paper on the manufacture of mechanical rubber goods. It was written by Mr. Frank D. Voorhees, the son of J. J. Voorhees, the Secretary and Treasurer of the New Jersey Car Spring & Rubber Co. Young Mr. Voorhees is a student of the Institute, and his article speaks well for the literary as well as the technical training given there.

=Fossil flour, manufactured by the Fossil Flour Co. of Bass River, N. S., is being shipped in considerable quantities to the tire manufacturers of England for use in making their lightest weight and highest grade tires. The New York office of the Fossil Flour Co. is at 229 Pearl street.

=On December 4 a deed was recorded with the town clerk of Naugatuck, Conn., transferring factory No. 4 of the Goodyear's Metallic Rubber Shoe Co. to the United States Rubber Co. It has been the rubber-reclaiming plant of the first company named, and is the largest and finest reclaiming plant in existence. It is to be used in future for reclaiming rubber for all the factories operated by the United States Rubber Co.

=Workmen were engaged during the month in removing the machinery from the factory at Franklin, Mass., formerly occupied by the Boston Rubber Co., which has been sold to a new concern in Canada. The factory is regarded as being closed permanently.

=Mr. Holmes, the senior member of the firm of Holmes & Co., who run a prosperous rubber store in Washington, D. C., was a recent visitor to Boston where he was stocking up for the spring trade.

=Mr. Geo. F. Virtue has accepted a position with the Clifton Mfg. Co., of Boston, as manager of their mechanical goods department. The Clifton are to be congratulated on getting so energetic and able a manager and salesman as Mr. Virtue has proved himself to be.

=Mr. Albert T. Holt, Superintendent of the Diamond Rubber Co., Akron, Ohio, was a recent visitor to the East, stopping at Washington, Philadelphia, New York, and Boston.

=Mr. Thos. H. Harney and Mr. Geo. H. Sargent, salesmen for the Tyer Rubber Co., in the west and south are in from long trips and are spending a couple of weeks about Boston before starting out again to see their trade.

=Mr. J. Francis Hayward, Treasurer of the Cable Rubber Co., Boston, leaves for Europe about the middle of January, taking his wife and daughter with him. He expects to be gone about two months.

=Every one is familiar with the rubber ring used on glass preserve jars, but few appreciate the extent of the industry—last year it amounted to several hundred thousand dollars. Being sold to jar manufacturers by the pound, their interest lies in securing the lightest possible ring; the consumer's interest in a quality which does not readily crack or harden, and a size sufficiently full to make a good, tight joint. The New York Belting & Packing Co. have been for years large manufacturers of jar rings. In preparing their line for 1897, they have borne in mind the points essential to both manufacturers and consumers, and their rings will be found excellent in quality, correct in size and unusually light in weight. Samples are now ready at the New York city headquarters, No. 25 Park Place, and also at their stores and agencies throughout the country.

=The New York Belting & Packing Co., Ltd., inform us that the name "Nonpareil" adopted by them this season for one of their new brands of Garden Hose, is found to have been in use for some time by another concern. They have therefore substituted for it the name "Tuxedo," the quality of the hose being unchanged.

=It is announced by the Joseph Banigan Rubber Co. that they have purchased land adjoining their present plant and have had the drawings made for a factory with a capacity of 50,000 pairs of rubbers per day. Their address is at Providence, R. I.,—P. O. Box 308.

=The Peerless Rubber Manufacturing Co. have established a distributing depot in the northwest, being represented from January 1 by H. D. Edwards & Co., Nos. 16-24 Woodward avenue, Detroit, Mich., who will be the Peerless company's general agents, carrying a complete line of rubber belting, hose, packing, and general rubber goods for mechanical purposes. H. D. Edwards & Co. were established in 1855, and represent in their section a number of important manufacturing concerns in various lines. Another rubber firm represented by them is the Eureka Fire Hose Co.

=Charles Mackintosh & Co., Limited, the famous English rubber-manufacturers, after having been largely interested in the tire-manufacture for several years past, have recently added to their output an extensive line of bicycles.

=A thousand feet of new fire hose has been bought for the state hospital of St. Lawrence, N. Y., which has an effective fire department. The number and extent of such institutions, throughout the country, make them an important field for the sale of rubber goods.

=The Monarch Rubber Co. (St. Louis) are sending out a very pretty card referring to a former one known as "Our Bell Boy" and suggesting that that same attractive young man is candidate for the coming season. This Bell Boy, by the way, appears this time in a very swell overcoat with a tall hat and the perennial smile that makes him so many friends.

=The Kokomo Rubber Co. (Kokomo, Ind.) have adopted as a trade-mark the picture of a bear. That they have a right to this no one will dispute when they know that the word Kokomo is Indian in its origin and means she-bear.

=*Shoe and Leather Facts*, Philadelphia, pays Mr. John P. Lyons, the manager of the advertising department of the United States Rubber Co., a very pleasant compliment in describing some of the later advertisements that he has designed and giving him full credit for them.

=It is very pleasant to see Mr. Frank D. Balderston again in the rubber business. Mr. Balderston now has his desk at 43 Bedford street, Boston, and has full charge of a department created especially for him by the United States Rubber Co., embracing tennis, gymnasium and yachting shoes.

=The Marlboro Rubber Co. (Marlboro, Mass.) have nine branches in various parts of the country for the sale of bicycles and sundries. They have exclusive rights for the resorts on the Florida coast, guaranteed by H. M. Flagler. Last year the concession was held by the Pope Manufacturing Co.

=Since the Hood Rubber Co. began the operation of their factory at Watertown, Mass., there has been a movement on foot to secure a postoffice at East Watertown—the suburb in which the factory is located.

=A Baltimore newspaper mentions the appearance of the first set of rubber horse shoes in use on the streets of that city.

=W. F. Askam, superintendent of the United States Rubber Reclaiming Works (Derby, Conn.), is said to have invented a new process for cleaning the reclaimed rubber, more expeditiously and more cheaply than heretofore. The details are as yet a secret, but Mr. Askam is said to have received some large offers for his discovery.

=Apropos of advertisements, the "official ballot" with squares opposite such candidates as rubber belting, hose couplings, lawn sprinklers, etc., sent out by W. D. Allen & Co., was one of the most original and effective that has yet come to our notice.

=Prescott Bros. (Cornhill, Boston, Mass.) are selling this year in connection with their large garden hose trade the very latest fixtures in hose pipes and sprinklers,

=Mr. Frank Venn, one of the valued employees of the Boston Rubber Shoe Co., is the inventor of a very neat device by which cartons may be numbered almost as fast as they can be counted.

=Colonel Harry E. Converse, son of the rubber-shoe manufacturer who has made the town of Malden famous, has been appointed to the staff of Governor Wolcott, of Massachusetts. He has served a term in the Malden council, has been one of the fire commissioners for three years past, and was a quartermaster in the state militia for eight years. He is now manager of his father's large business at Malden.

=The Joseph Banigan Rubber Co. have included in their equipment at Olneyville, R. I., a last factory, under the management of one of the most experienced last-makers in the country. This feature is of great advantage to a modern rubber boot and shoe plant. Suggestions for new styles and designs come in a large measure from the jobbers and retailers of boots and shoes, and a factory with its own plant for lasts can put such suggestions into shape often more promptly than when lasts have to be ordered outside.

=The order for sixty rubber belts in lengths of fifty to one hundred feet for the garbage-reduction plant at Barren Island, near New York, was secured by the well-known rubber house of Latta & Mulconroy, Philadelphia, Pa.

=Mr. W. L. Gaylord, who for fourteen years past has traveled for the Stoughton Rubber Co., has severed his connection with that concern and now has full charge of the men's goods manufactured by the Clifton Mfg. Co., of Boston. Mr. Gaylord will cover his old territory, which embraces Boston, New York, Philadelphia and Baltimore.

=The second annual convention of the National Association of Manufacturers will be held January 26, 27, and 28, 1897, at Philadelphia, Pa.

=An amusing letter from Mr. E. H. Garcin, treasurer of the Trenton Rubber Co. calls attention to the fact that the types in his advertisement last month made his name Garcia. The fact that this latter name is attached to a very fine brand of cigars seemed to placate Mr. Garcin in a measure, particularly as he hints in a friendly way that that is the brand of cigar that he uses, which hint is hereby acknowledged and will be paid in full.

=Mr. John L. Chapman, who travels through the western country for the Home Rubber Co., has just returned from a prolonged trip, a part of his journey, by the way, having been made interesting by a several days' delay in the snow banks of Nevada.

REVIEW OF THE INDIA-RUBBER MARKET.

FOR the month following our last publication there has been little change to record in the crude rubber situation or in prices, except that the last few days have shown a slight decline in the prices for Pará, with a similar decline in Africans, due to sympathetic causes. Prices are still so high, however, as to preclude buying beyond the current needs of consumers. The stocks of rubber in manufacturers' hands are by no means large, but it will require a material reduction in prices to encourage active buying, especially since arrivals in primary markets continue larger than for a corresponding period in the past year. It is understood that England is still a very good buyer in Pará, which has contributed to the firmness of the market there, and has tended to keeping up prices in New York.

The latest quotations in the New York market are:

PARÁ.		
Islands, fine, new	78	@79
Islands, fine, old	none here	
Islands, coarse, new	44½	@45
Islands, coarse, old	none here	
Upriver, fine, new	80	@81
Upriver, fine, old	87	@89
Upriver, coarse, new	52	@53
Upriver, coarse, old	none here	
Caucho (Peruvian) sheet	39	@40
Caucho (Peruvian) strip	43	@44
Caucho (Peruvian) ball	49	@50
CENTRALS.		
Esmeralda, sausage	50	@51
Guayaquil, strip	35	@40
Nicaragua, scrap	48	@50
Nicaragua, sheet	none here	
Mangabeira, sheet	40	@41
AFRICAN.		
Thimbles	33½	@35
Tongues	38	@39
Sierra Leone	25	@52
Benguela	49	@50
Congo Ball	39	@42
Cameroon Ball	38	@39
Flake and Lumps	24	@25
Accra Flake	18	@20
Accra Buttons	47	@48
Accra Strips	51	@54
Lagos Buttons	42	@43
Lagos Strips	42	@43
Liberian Flake	30	@31
Madagascar, pinky	58	@60
Madagascar, black	42	@44
Mozambique, red ball		@....
Mozambique, white ball		@....
EAST INDIAN.		
Assam	42	@56
Borneo	26	@38
GUTTA-PERCHA.		
Fine grade		1.30
Medium		1.00
Hard white		85
Lower sorts		
Balata		

Late Pará cables quote:

	Per Kilo.		Per Kilo.
Islands, fine	7 $200	Upriver, fine	7 $800
Islands, coarse	3 $600	Upriver, coarse	4 $800

Exchange 8⅝

NEW YORK PRICES FOR DECEMBER.

	1896.	1895.	1894.
Upriver fine	82@85	77@78	72 @76
Upriver coarse	53@58	57@58	56½@58
Island fine	79@83	75@76	69½@73
Island coarse	44@48	45@46½	48 @51
Cameta coarse	51@53	48@49	51½@55½

The statistical position of Pará rubber in New York and elsewhere is as follows, the figures expressing tons of 1000 kilograms:

	Fine and Medium.	Coarse.	Totals.	Totals. 1895.	Totals. 1894.
Stock, November 30	238	107 =	344	233	941
Arrivals, December	1000	293 =	1293	1080	1048
Aggregating	1238	399 =	1637	1313	1989
Deliveries, December	906	298 =	1204	1045	908
Stock, December 31	332	101 =	433	268	1081

	1896.	1895.	1894.
Stock in England, December 31	993	512	610
Deliveries in England, December	725	550	575
Pará receipts, December	2930	2600	2090
Stock in Pará, December 31	500	270	480
World's supply Dec. 31 (excluding Caucho)	3595	3145	3677
Pará receipts since July 1	11,090	10,280	9200

In regard to the financial situation Albert B. Beers, India-rubber and commercial paper (No. 58 William street, New York), advises us as follows:

"During December the money market ruled very easy in this city and vicinity, and there was a good demand for commercial paper, the best single and double names being taken at 4 @ 4½ per cent., and names not so well-known at 5 @ 6 per cent. A good many banks were seeking investment in commercial paper, the supply of desirable quality in the rubber line not being equal to the demand, and doubtless the same conditions prevailed in other lines. From the present outlook the same conditions will no doubt prevail in January."

THE ANTWERP RUBBER MARKET.

TO THE EDITOR OF THE INDIA RUBBER WORLD: Our last report was dated November 21. Notwithstanding the somewhat weaker advices from England, our market has displayed considerable activity during the month of December, and prices show an advance of 1 to 2 per cent. on valuations, especially for finer grades. Sales have aggregated 293 tons, of which we mention the most interesting as follows:

30 tons Upper Congo-Uellé, of which 8½ spot and 21½ to arrive within three months (valuation 5.30 francs) sold at 5.35 francs per kilogram.

30 tons red Congo thimbles, to arrive within three months (valuation 3.60 francs) at 5.80 francs.

12 tons red Kassai (valuation 6.50) at 6.95 francs.

11 tons Mongalla (Upper Congo) balls (valuation 5.90) at 6.02½ francs.

35 tons Upper Congo Lopori balls at 6.45 francs, on November 28.

14 tons same (expected end of December) at 6.30 francs, on December 22.

69 tons Equateur balls (valuation 6.10) at 6.15 francs.

10 tons same, at 6.22½ francs.

The steamer *Albertville* is expected to arrive from the Congo by the end of December with about 120 tons (269,520 pounds), part of which has been sold in advance. Our stock this day is estimated at about 88 tons, against 175 tons at the end of November.

C. SCHMID & CO.

Antwerp, December 23, 1896.

RUBBER SALES AT ANTWERP.

[*Quantities Expressed in pounds.*]

	1893.	1894.	1895.	1896.
January	9,489	13,447	49,931	133,929
February	27,586	34,967	33,635	157,348
March	7,236	1,980	137,990	130,255
April	14,566	3,811	42,132	134,601
May	34,974	36,278	115,863	113,009
June	8,721	5,679	51,480	191,400
July	....	22,104	77,845	104,230
August	38,199	81,823	103,376	279,057
September	49,038	56,507	98,012	307,336
October	77,629	49,696	140,769	343,200
November	66,414	172,089	108,079	48,400
December	24,497	65,050	14,769	644,600
Total	358,347	543,430	972,881	2,587,365

IMPORTS FROM PARA.

THE receipts of India-rubber direct from Pará and Manáos at the port of New York since our last publication are reported in detail below, the figures referring to pounds:

December 12.—By the steamer *Gregory*, from Manáos and Pará:

	Fine.	Medium.	Coarse.	Caucho.	Total.
Reimers & Meyer	189,200	79,500	68,800	10,900	348,400
New York Commercial Co.	225,900	41,100	75,500	1,500	344,000
Sears & Co.	44,200	16,200	19,600	2,900	82,900
Lawrence Johnson & Co.	22,500	1,400	22,800	....	46,700
Joseph Banigan	10,400	7,900	3,600	....	21,900
Shipton Green	15,000	2,900	3,800	....	21,700
Otto G. Mayer & Co.	14,100	3,600	4,200	....	21,900
Sgal & Co.	....	....	9,600	....	9,600
George G. Cowl	3,600	1,100	1,000	....	5,700
P. Lima	2,900	....	2,300	....	5,200
Totals	527,800	153,700	211,200	15,300	908,000

December 21.—By the steamer *Dunstan*, from Pará:

New York Commercial Co.	183,000	34,100	51,300	1,500	269,900
Reimers & Meyer	126,300	29,300	55,800	....	211,400
Sears & Co.	77,900	16,100	19,900	....	113,900
Lawrence Johnson & Co.	....	....	21,600	4,300	25,900
Otto G. Mayer & Co.	....	....	22,800	....	22,800
P. Lima	7,500	....	4,800	....	12,300
Totals	394,700	79,500	176,200	5,800	656,200

December 30.—By the steamer *Cametense*, from Manáos and Pará:

Reimers & Meyer	308,500	135,600	111,100	6,400	561,600
New York Commercial Co.	196,400	51,400	66,000	12,300	326,100
Sears & Co.	121,300	21,800	16,700	....	159,800
Lawrence Johnson & Co.	22,100	5,200	25,500	....	52,800
Joseph Banigan	14,300	3,200	4,100	....	21,600
Shipton Green	12,100	4,600	5,100	....	21,800
P. Lima	4,600	....	2,700	....	7,300
Totals	679,300	221,800	231,200	18,700	1,151,000

	1896.	1895.
January Imports from Pará	2,718,300	2,869,500
February Imports	1,945,900	2,274,400
March Imports	2,786,300	3,611,700
April Imports	1,941,500	2,156,400
May Imports	1,527,800	1,651,400
June Imports	583,900	1,030,100
July Imports	727,000	666,200
August Imports	872,500	766,500
September Imports	896,900	1,335,900
October Imports	1,671,200	1,523,700
November Imports	1,797,600	2,195,600
December Imports	2,715,200	3,778,500

PARA RUBBER VIA EUROPE.

December 7.—By the steamer *La Champagne*, from Havre:

Otto G. Mayer & Co. (caucho)	9,500

December 7.—By the steamer *Umbria*, from Liverpool:

Reimers & Meyer (fine)	64,000
George A. Alden & Co. (fine)	24,100

December 10.—By the steamer *Majestic*, from Liverpool:

Otto G. Mayer & Co. (fine)	9,000

December 14.—By the steamer *La Bourgogne*, from Havre:

Otto G. Mayer & Co. (caucho)	48,000

December 18.—By the steamer *Germanic*, from Liverpool:

George A. Alden & Co. (fine)	48,900
(medium)	18,500
(coarse)	12,200

December 19.—By the steamer *Etruria*, from Liverpool:

George A. Alden & Co. (coarse)	5,400
Sgal & Co. (coarse)	18,000

December 23.—By the steamer *Teutonic*, from Liverpool:

George A. Alden & Co. (fine)	15,300
(medium)	2,800
(coarse)	2,800

OTHER NEW YORK ARRIVALS.

BELOW will be found in detail the imports at New York during December, 1896, of India-rubber from Mexico, Central America and South America, other than Pará grades, also arrivals at New York of African and East Indian sorts:

CENTRALS.

DEC. 1.—By the *Ardandhu*=Greytown:

	POUNDS.
A. P. Strout	13,000
Andreas & Co	2,600
Munoz & Espriella	1,000
Cadenas & Coe	1,000
Kunhardt & Co.	800
Total	17,300

DEC. 5.—By the *Finance*=Colon:

A. Santos & Co.	8,779
H. Feltman & Co	8,292
W. R. Grace & Co	5,329
A. N. Rotholz	3,175
Dumarest & Co.	2,107
Flint, Eddy & Co.	2,000
A. P. Strout	1,354
Frame, Alston & Co	1,094
A. James & Co.	745
Elmenhorst & Co	611
G. Amsinck & Co	575
J. Menendez & Co.	334
Lanman & Kemp	270
A. M. Capen's Sons	200
Total	34,865

DEC. 5.—By the *Mexico*=Colon:

Eggers & Heinlein	1,500

DEC. 7.—By the *Umbria*=Liverpool:

Windmuller & Roelker	6,800

DEC. 9.—By the *Athos*=Cartagena:

Flint, Eddy & Co.	1,500
J. Ferro	1,500
D. A. DeLima & Co.	700
Kunhardt & Co.	500
Munoz & Espriella	500
Total	4,700

DEC. 9.—By the *Harald*=Greytown:

Samper & Jimenez	2,500
Otto G. Mayer & Co.	600
For London	100
Total	3,200

DEC. 14.—By the *Valencia*=Colon:

H. Feltman & Co.	9,210
A. Santos & Co.	9,003
W. R. Grace & Co.	7,989
W. Loaiza & Co.	7,878
Flint, Eddy & Co.	6,156
G. Amsinck & Co.	5,910
Roldan & Van Sickle	2,200
A. M. Capen Sons	2,247
Hoadley & Co.	2,058
Piza, Nephews & Co.	1,546
Lanman & Kemp	1,261
Dumarest & Co.	1,142
Elmenhorst & Co	585
Geo. R. Cottrell & Co.	418
H. Marquardt & Co	425
J. Aparicio & Co.	209
Graham Hinckley & Co.	250
Thebaud Bros.	200
Total	58,727

DEC. 15.—By the *Ardanrose*=Greytown:

Andreas & Co.	8,500
A. P. Strout	4,500
G. Amsinck & Co.	3,200
Munoz & Espriella	2,500
Total	18,700

DEC. 16.—By the *Alleghany*=Cartagena:

D. A. De Lima & Co.	1,500

DEC. 16.—By the *El Mar*=New Orleans:

W. H. Crossman & Bro.	7,000
Albert T. Morse	3,000
Total	10,000

Dec. 21—By the *Grenada*=Trinidad:

Jose Agostini	2,500

DEC. 19.—By the *El Sol*=New Orleans:

Albert T. Morse	6,500

DEC. 21.—By the *Advance*=Colon:

Frame, Alston & Co.	2,600
H. Feltman & Co.	1,200
J. Brandon & Bros.	957
Total	4,757

DEC. 21.—By the *Louisiana*=New Orleans:

Albert T. Morse	4,200

DEC. 22.—By the *Croatia*=Bahia:

Elmenhorst & Co.	4,500

DEC. 23.—By the *Grecian Prince*=Bahia :

Otto G. Mayer & Co	6,500

DEC. 24.—By the *Seneca*=Mexico :

C. Viadero	700
E. N. Tibbals	200
H. Marquardt & Co	300
G. Amsinck & Co	100
Total	1,300

DEC. 29.—By the *Creole*=New Orleans :

Albert T. Morse	9,000
W. H. Crossman & Bro	8,000
Total	17,000

DEC. 30.—By the *Adirondack*=Cartagena :

D. A. DeLima & Co	4,000

Dec. 30.—By the *Ardanhu*=Greytown :

Andreas & Co	15,000
A. P. Strout	8,200
Munoz & Espriella	3,000
A. N. Rotholz	1,000
Total	27,200

Total Centrals for December	236,349
Total for November	183,539
Total for October	180,462
Total for September	185,993
Total for August	116,215
Total for July	231,044
Total for June	154,987
Total for May	260,926
Total for April	175,511
Total for March	167,924
Total for February	297,762
Total for January	339,937

AFRICANS.

DEC. 3.—By the *Michigan*=London :

	POUNDS.
Henry H. Smythe	3,500

DEC. 4.—By the *Britannic*=Liverpool :

George A. Alden & Co	21,400
Otto G. Mayer & Co	20,200
Total	41,600

DEC. 7.—By the *British Queen*=Antwerp :

Albert T. Morse	33,000
Sgal & Co	3,200
Total	36,200

DEC. 7.—By the *Umbria*=Liverpool :

George A. Alden & Co	52,100
Sgal & Co	22,300
Reimers & Meyer	36,900
Total	111,300

DEC. 10.—By the *Majestic*=Liverpool :

Albert T. Morse	11,500
Sgal & Co	2,200
Otto G. Mayer & Co	1,200
Total	14,900

DEC. 14.—By the *Lucania*=Liverpool :

Reimers & Meyer	7,000
Sgal & Co	2,200
Total	9,200

DEC. 15.—By the *Spaarndam*=Rotterdam :

George A. Alden & Co	51,000

DEC. 16.—By the *Taurie*=Liverpool :

George A. Alden & Co	179,100

DEC. 17.—By the *Friesland*=Antwerp :

Reimers & Meyer	17,300

DEC. 18.—By the *Germanic*=Liverpool :

George A. Alden & Co	36,900

DEC. 19.—By the *Etruria*=Liverpool :

George A. Alden & Co	35,500
Sgal & Co	3,100
Reimers & Meyer	29,700
H. H. Smythe	5,000
Total	73,300

DEC. 21.—By the *St. Cuthbert*=Antwerp :

George A. Alden & Co	71,300
Sgal & Co	2,200
Total	73,500

DEC. 23.—By the *Teutonic*=Liverpool :

George A. Alden & Co	8,800
Otto G. Mayer & Co	2,100
Total	10,900

DEC. 24.—By the *Asturia*=Hamburg :

Reimers & Meyer	19,000

DEC. 24.—By the *Werkendam*=Rotterdam :

George A. Alden & Co	13,800

DEC. 26.—By the *Campania*=Liverpool :

Reimers & Meyer	13,000
Sgal & Co	12,000
Total	25,000

DEC. 28.—By the *Prussia*=Hamburg :

Reimers & Meyer	38,000
Albert T. Morse	14,000
George A. Alden & Co	7,800
Windmuller & Roelker	3,200
Sgal & Co	7,800
Total	70,800

DEC. 29.—By the *Nomadic*=Liverpool :

H. H. Smythe	5,000

DEC. 31.—By the *Westernland*=Antwerp :

Reimers & Meyer	15,000

Total Africans for December	312,000
Total for November	588,200
Total for October	419,300
Total for September	287,800
Total for August	168,600
Total for July	234,300
Total for June	393,300
Total for May	693,800
Total for April	315,300
Total for March	775,100
Total for February	316,300
Total for January	424,900

EAST INDIAN.

DEC. 12.—By the *Kaisow*=Singapore :

	POUNDS.
Reimers & Meyer	11,700
Reimers & Meyer (Pontianak)	55,000
Robert Soltau & Co	7,800
Total	74,500

DEC. 12.—By the *St. Louis*=Southampton :

Reimers & Meyer	5,200

DEC. 14.—By the *Lucania*=Liverpool :

Reimers & Meyer	3,500

DEC. 24.—By the *Argyll*=Singapore :

Reimers & Meyer—(Pontianak)	51,300

DEC. 28.—By the *Prussia*=Hamburg :

George A. Alden & Co	500

Total East Indian for December	135,000
Total for November	81,200
Total for October	12,500
Total for September	171,800
Total for August	418,300
Total for July	53,900
Total for June	130,900
Total for May	576,500
Total for April	522,400
Total for March	310,100
Total for February	265,600
Total for January	315,400

RECAPITULATION.

	POUNDS.
Pará—direct imports	2,715,200
Pará—via Europe	327,500
Centrals	236,349
Africans	812,000
East Indian	135,000
Total at New York for December	3,226,049
Total for November	2,880,139
Total for October	2,463,162
Total for September	1,976,893
Total for August	1,659,815
Total for July	1,806,244
Total for June	1,280,587
Total for May	3,171,726
Total for April	3,271,311
Total for March	4,192,224
Total for February	2,840,862
Total for January	2,823,537

NEW ORLEANS.

DECEMBER.

	POUNDS.	VALUE.
Nicaragua	50,399	$21,847
Colombia	474	166
Total	50,873	$22,013

NOVEMBER EXPORTS OF INDIA-RUBBER FROM PARA.

From "A Provincia do Pará."

[NOTE.—The figures denote weights in Kilograms.]

EXPORTERS.	UNITED STATES.					EUROPE.					TOTAL.
	FINE.	MEDIUM.	COARSE.	CAUCHO.	TOTAL.	FINE.	MEDIUM.	COARSE.	CAUCHO.	TOTAL.	
Pusinelli, Prüsse & Co	173,687	42,360	113,306	—	329,353	156,258	18,331	39,942	6,823	221,354	550,707
Adelbert H. Alden	102,126	30,804	70,846	3,897	267,673	22,440	6,460	41,350	—	70,250	337,923
La Rocque da Costa & Co	33,830	6,800	42,880	110	83,620	125,460	18,020	42,400	—	185,880	269,500
Rud. Zietz	6,720	1,721	5,100	—	13,541	85,840	8,310	67,500	218	161,868	175,409
R. F. Sears & Co	73,727	16,705	26,838	1,445	118,715	29,400	2,810	3,600	—	35,810	154,525
Singlehurst, Brocklehurst & Co	—	—	—	—	—	14,640	1,867	3,151	—	19,658	19,658
Pires, Teixeira & Co	6 690	—	5,590	—	12,280	—	—	—	—	—	12,280
Denis Crouan & Co	—	—	2,100	—	2,100	5,440	680	—	—	6,120	8,220
B. A. Antunes & Co	3,400	680	1,120	—	5,200	—	—	—	—	—	5,200
Sundry small shippers	—	—	—	—	—	9,800	510	1,990	—	12,300	12,300
Direct from Manáos	158,789	58,547	48,337	5,581	271,254	240,428	104,847	69,473	15,887	430,635	701,889
Total	618,969	157,617	316,117	11,033	1,103,736	689,706	161,835	269,406	22,928	1,143,875	2,247,611
Total for October	824,945	159,242	229,858	41,209	1,255,254	433,403	79,221	262,319	5,280	780,223	2,035,477
Total for September	623,393	134,616	206,244	107,886	1,072,139	336,074	67,303	178,755	10,393	592,525	1,664,064
Total for August	131,233	27,295	111,077	40,462	310,517	505,308	86,583	209,855	49,956	851,702	1,162,219